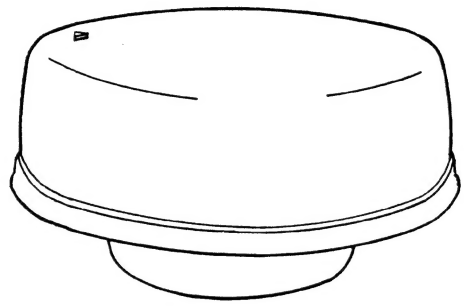
ORDER NO. KM49107741C1
F8

Service Manual

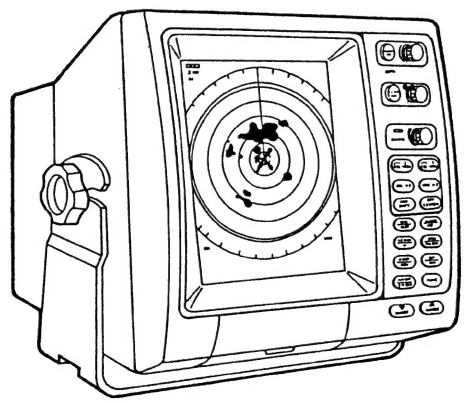
and Technical Guide

MARINE RADAR

KX-G8100



(Model KX-G8100DM)



(Model KX-G8100MO)

Panasonic

When you refer to the serial number, write down all 11 digits. The serial number may be found on the label affixed to the bottom of the unit.

TABLE OF CONTENTS

FEATURES

- 7-inch daylight bright high resolution display
- 1.5 kW power
- Easy view screen
- High-speed LSI graphic controller
- Screen (frame) memory
- 4-level target quantization
- Compact radome antenna
- Dual pulse rates and pulse lengths
- Two EBLs (Electric Bearing Lines)
- Two VRMs (Variable Range Markers)
- Echo freeze with auto return
- Inter-target distance measurement between two targets
- Off-center (an additional half radius in any direction)
- Flexible guard zone with audible alarm
- Multi-interval plotting to show the track of moving targets on the screen
- On-screen alpha-numeric readouts for Range, Rings, Distance, Plot, Interference Rejection, Expansion, Freeze, A.C.Rain, EBL and VRM
- 1.4 foot antenna
- Navigation Receiver interface (NMEA 0183 interface Format), LAT/Long, Vessel Speed, Range/Bearing to waypoint.
- Back Lighted Keypad
- Target Expansion at Ranges greater than 4 NM.
- 8 CRT Brilliance Levels
- Power Saving Mode for reduction of battery Consumption

CRT DISPLAY SAFETY PRECAUTIONS

X-Radiation

Warning: The only potential source of X-Radiation is the picture tube. However when the high voltage circuitry is operating properly there is no possibility of an X-Radiation problem. The basic precaution which must be exercised is to keep the high voltage at the following factory recommended level.

Note: It is important to use an accurate periodically calibrated high voltage meter.

1. To measure the high voltage, connect a high voltage meter to the unit (⊖ to CRT Ground Strap and ⊕ to CRT anode).
2. Turn Brightness control fully counterclockwise (minimum brightness).
3. Measure the high voltage. The high voltage meter (electrostatic type) reading should indicate 12.0 kV± 1.0 kV.
4. If the meter indication is out of tolerance, immediate service is required to prevent the possibility of premature component failure.
5. To prevent X-Radiation possibility, it is essential to use the specified picture tube. Any attempt to substitute a tube of a different manufacturer or color can result in a serious X-Radiation hazard and component failure.

A general class FCC licence is required to service this product. Please refer all service to qualified service facility.

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SPECIFICATIONS

•ANTENNA

1. Type:	1.4 ft. (43 cm) (Nominal length) Center-fed waveguide slot array, Enclosed in the radome
2. Rotation Speed:	24 r.p.m. nominal
3. Beam width:	Horizontal 6 degrees nominal Vertical 25 degrees nominal
4. Side lobe:	21 dB
5. Polarization:	Horizontal

•TRANSMITTER

1. Modulation Type:	Hard Tube Type Modulator
2. Frequency:	9410±30 MHz, PON
3. Magnetron Type:	E3561 or Equivalent
4. Peak Power:	1.5 kW nominal
5. Pulse width and Repetition Frequency (prf):	0.1 µs/prf 2500 Hz (0.25 to 2 NM) 0.5 µs/prf 1000 Hz (4 to 16 NM)

•RECEIVER

1. Type:	Super heterodyne
2. Intermediate Frequency:	60 MHz
3. Mixer and local OSC:	MIC (Microwave Integrated Circuit) with limiter
4. Duplexer:	Circulator
5. Noise Figure:	9 dB nominal

•MAIN UNIT (DISPLAY AND MAIN CONTROLER)

1. Display type:	Raster Scan, Daylight viewing
2. CRT:	7 inch Green Monochrome CRT
3. Picture Quality:	Non-interlaced Scanning Effective Diameter 3.74" (95 mm)

4. Range & range rings interval:

Range	0.25	0.5	1	2	4	8	16
Ring	0.125	0.125	0.25	0.5	1	2	4

(Unit: NM)

5. Range Discrimination:	Less than 79 ft. (24 m)
6. Minimum Range:	Less than 98 ft. (30 m)
7. Range Accuracy:	1.1% or 33 ft. (10 m), whichever is the greater value
8. Bearing Accuracy:	1 degree

•POWER SUPPLY

1. Input Voltage:	10.8~42 V DC
2. Power Consumption:	54 W approx. (25 W approx. in saving mode)
3. Protection:	Input Overvoltage Reverse Polarity protection

•ENVIRONMENTAL CONDITIONS

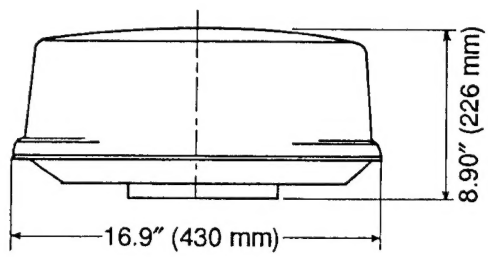
1. Ambient Temperature: −13°F to +158°F (−25°C to +70°C) for Antenna unit
   +5°F to +131°F (−15°C to +55°C) for Main unit
2. Relative Humidity: 95% at 104°F (40°C)
3. Protection against Water: Water resistant for Antenna unit
   Splash proof for Main unit
4. Wind Survival: Relative wind 100 knots

•COMPASS SAFE DISTANCE

	Standard Compass	Steering Compass
Antenna Unit	3.6 ft. (1.1 m)	4.9 ft. (1.5 m)
Main Unit	1.6 ft. (0.5 m)	1.3 ft. (0.4 m)

•SIZE AND WEIGHT

1. Weight (Antenna): 12.6 lbs (5.70 kg)
2. Size:



3. Weight (Main unit): 11.8 lbs (5.34 kg)
4. Size:

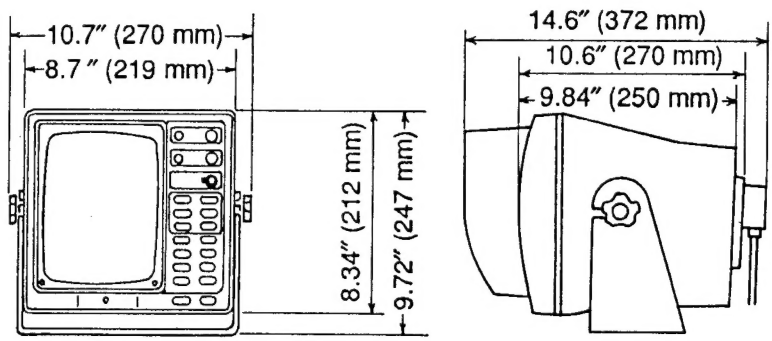
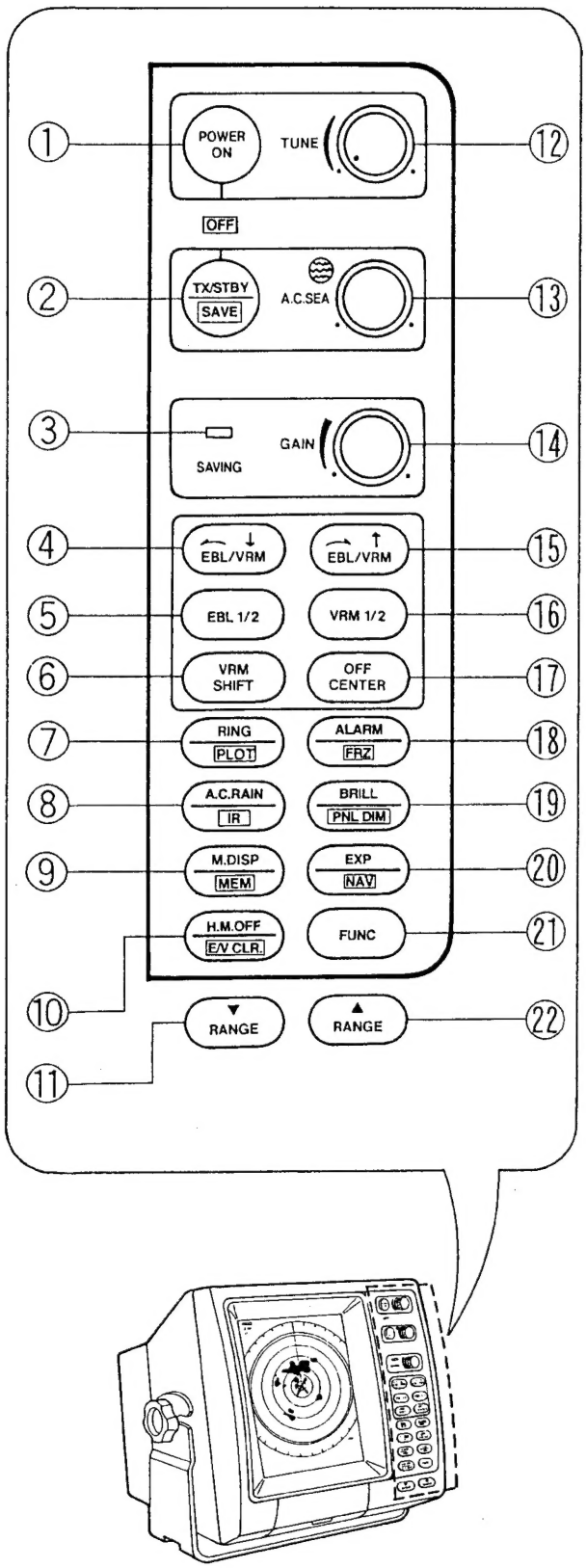


Fig. 1

Design and specifications are subject to change without notice.

LOCATION OF CONTROLS



Main Unit
(Display and Main Contoler)

Fig. 2

①**Power ON Button**
Used to turn ON the power source. Press this and TX/STBY button simultaneously to turn off the unit.

②**Transmit/Standby (Power Saving Mode) Button**
Switches between Transmit/Standby modes. /Set the Power Saving Mode.

③**Saving Mode Indicator**
This indicator lights in green when the system is in the Power Saving Mode.

④**EBL/VRM Position Button**
Used to measure the distance and bearing when the target is focused on by turning EBL counter clockwise and reducing VRM.

⑤**EBL1/EBL2 ON/OFF Button**
Turns ON/OFF EBL1 and EBL2.

⑥**VRM Shift ON/OFF Button**
Displays a third VRM on the screen to measure the distance between two targets.

⑦**Fixed Range Ring Display/(Plot) Button**
Displays/removes the fixed range rings./Displays sequential tracks of other vessels.

⑧**Anti Clutter Rain/(Interference Rejection) Button**
Eliminates rain clutter reflection from the screen./Turns on and off the interference rejection (IR) mode when pressed after the FUNC button.

⑨**Memory Display/(Memory Storage) Button**
Memorizes the current display or erases the memory./Recalls or eliminates the memorized display to or from the screen.

⑩**Heading Marker Off/(EBL & VRM Clear) Button**
Temporarily removes the heading marker from the screen./Deletes EBL and VRM.

⑪**Range (Down) Button**
Reduces the range of measurement.

⑫**Receiver Tuning Control Knob**
Adjusts the receiver sensitivity to the transmitter.

⑬**Anti Clutter Sea Control Knob**
Eliminates the unwanted echoes from the sea surface.

⑭**Receiver Gain Control Knob**
Adjusts the receiver gain.

⑮**EBL/VRM Position Button**
Used to measure the distance and bearing by sighting the target with the clockwise turn of EBL and the enlargement of VRM.

⑯**VRM1/VRM2 ON/OFF Button**
Turns ON/OFF the VRM1 and VRM2.

⑰**Off Center Button**
Shifts the position of your own ship 50% backward from the bearing indicated by EBL. This enables the user to observe a target located farther away.

⑱**Guard Zone Alarm/(Display Freeze) Button**
Sets or eliminates an alarm zone. When an alarm zone is set, the entry of an obstacle is informed with an alarm./Temporarily stops the display motion.

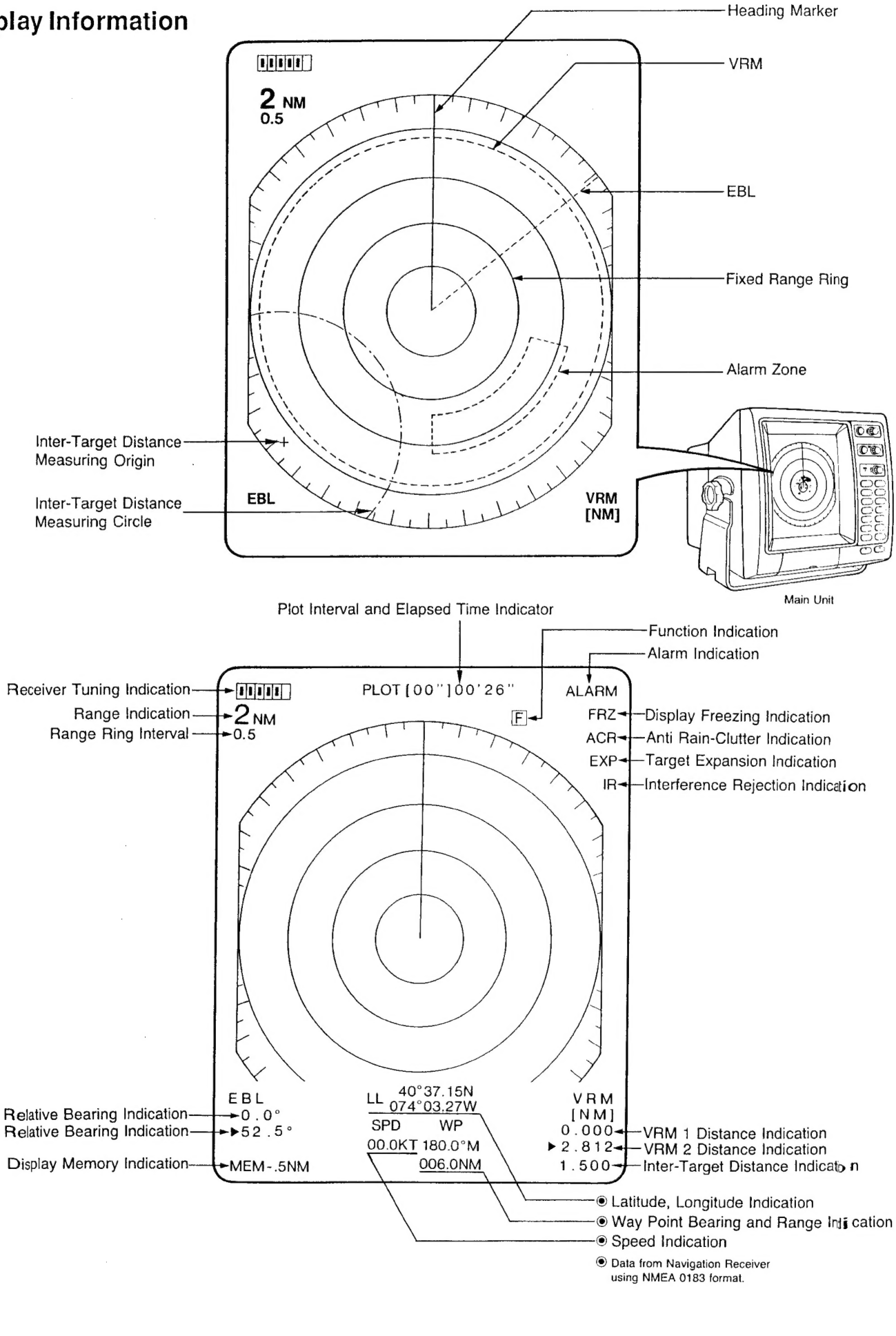
⑲**Display Brilliance Control/(Panel Illumination Dimmer) Button**
Adjusts the display brilliance./Adjusts the illumination of the control panel when pressed after the FUNC button.

⑳**Target Expansion/(Navigation Data Display) Button**
Used for target expansion./When Navigation Receiver is installed, pressing this button displays the longitude and latitude of own position, range and bearing to a waypoint.

㉑**Function Button**
Allows the user to select a function shown in blue reversed print on buttons ②, ⑦, ⑧, ⑨, ⑩, ⑱, ⑲ and ⑳.

㉒**Range (Up) Button**
Expands the range of measurement.

Display Information

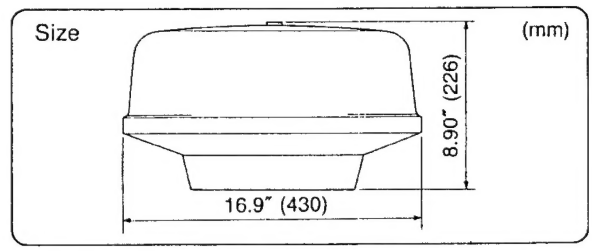


INSTALLATION AND CONNECTION

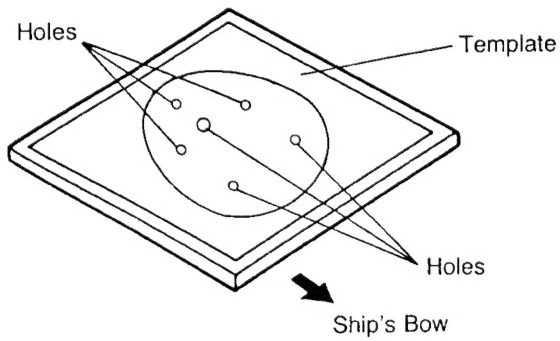
Mounting the Antenna Unit

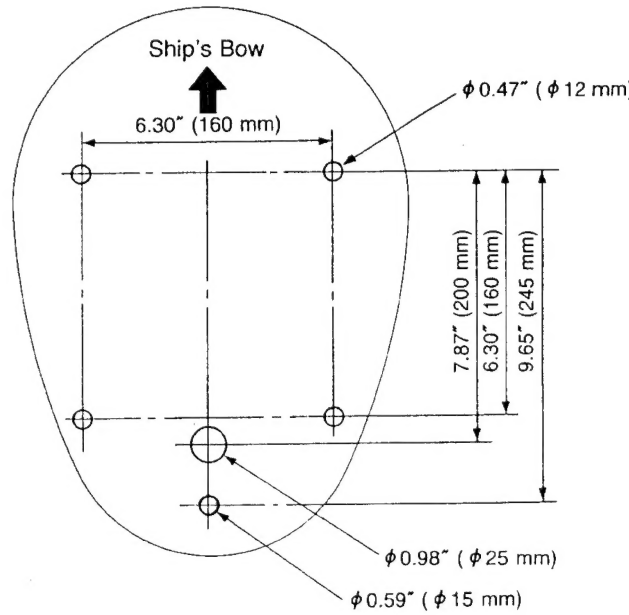
MOUNTING PROCEDURE:

Refer to an installer for the installation of the antenna unit.

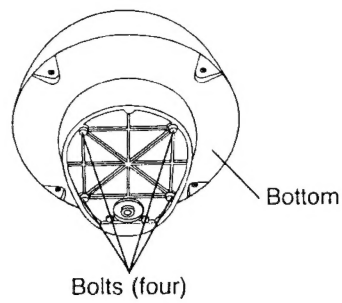


1. Drill six holes in the radar mounting position where the antenna unit is to be mounted using the included template.

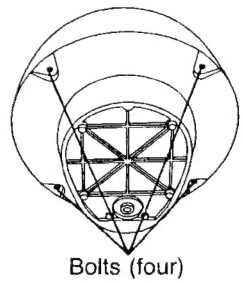




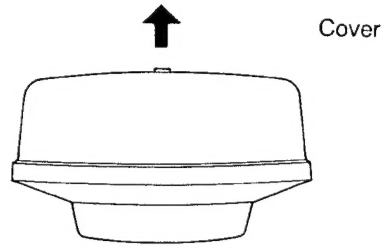
2. Remove the four bolts from the bottom of the antenna unit.



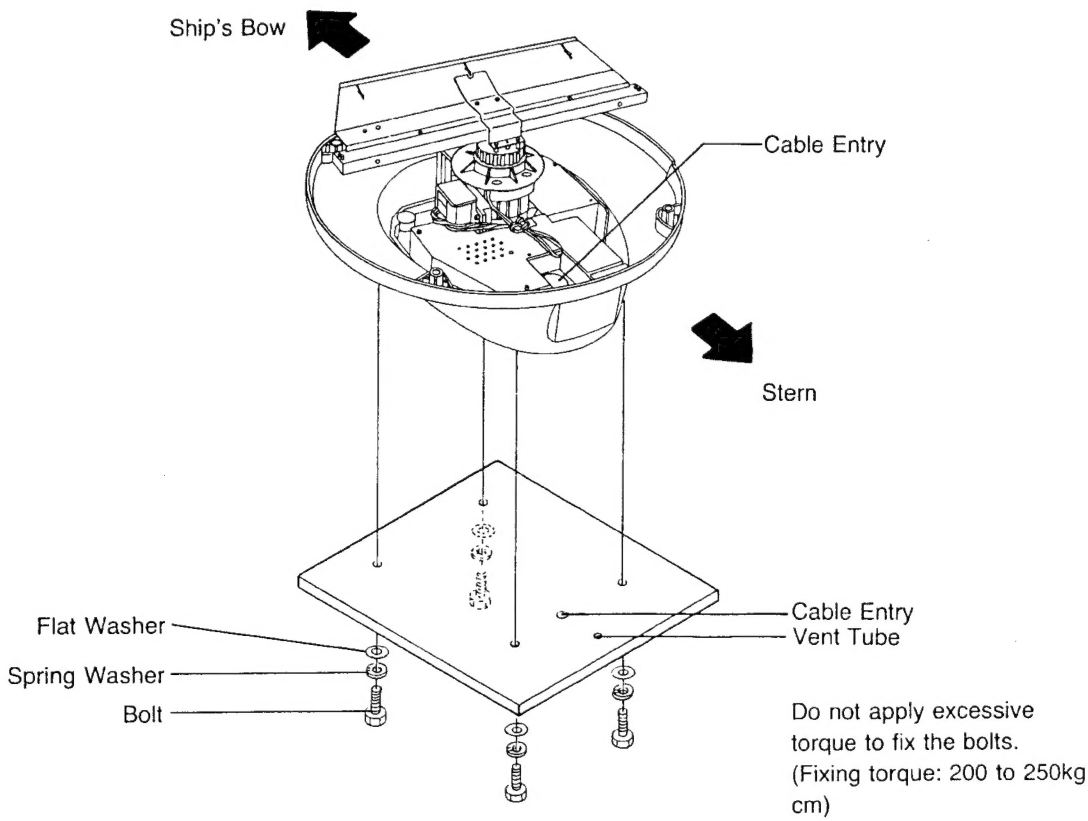
3. Loosen the four bolts at the bottom of the antenna unit.



4. Remove the cover, be careful not to damage the rubber gasket.



5. Install the antenna unit on the radar mount.



Make sure the antenna unit is installed in the proper direction relating to ships bow and stern.
The cable entry must face in direction of the stern.

6. Remove the four screws from the cable clamping plate.
7. Remove the rubber gasket.

Cautions: Do not touch anything inside the transmitter cover. Do not arrow any iron or steel items to come near the magnetron.

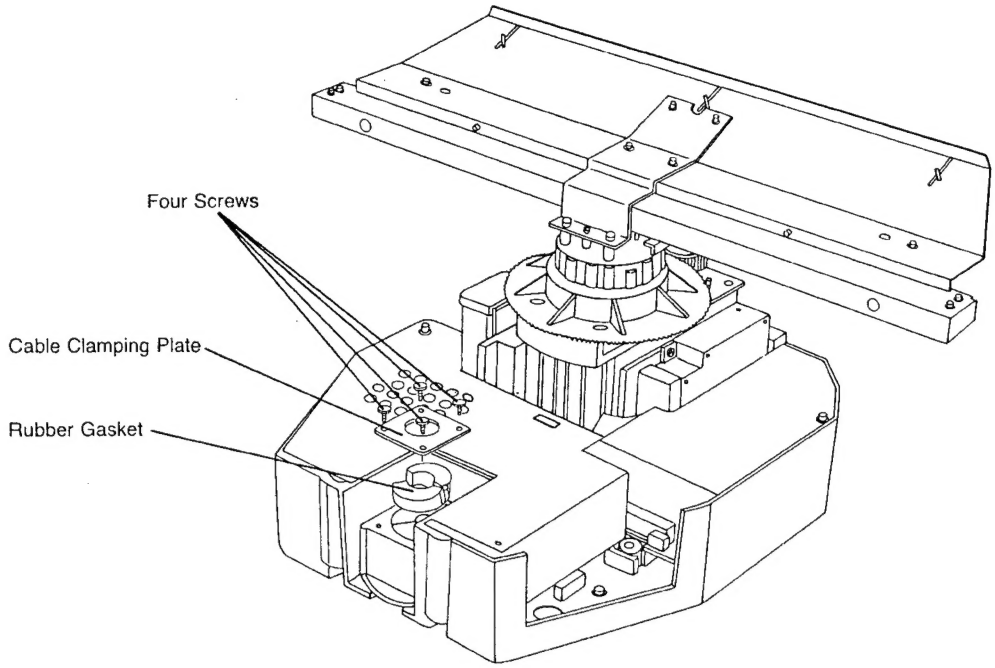


Fig. 10

8. Run the cable through the hole at the bottom of the antenna unit through the rubber gasket and through the cable clamping plate and connect the three plugs from the cable to the jacks as follows.

- 2-pin plug to CN 604 on the receiver PCB
- 6-pin plug to CN 805 on the transmitter PCB
- 5-pin plug to CN 803 on the transmitter PCB

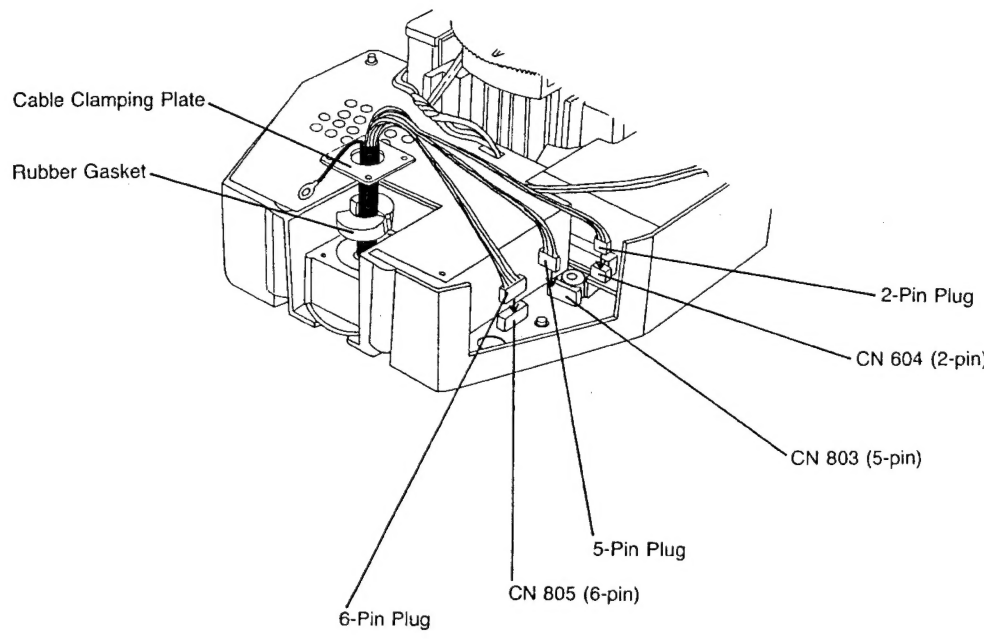


Fig. 11

9. Leaving one and half inch of the cable (before the break out) exposed above the clamping plate, replace the four screws and tighten down the plate.
Make sure the rubber gasket seals well around the cable.
To be tied the ground wire with screw as following picture.

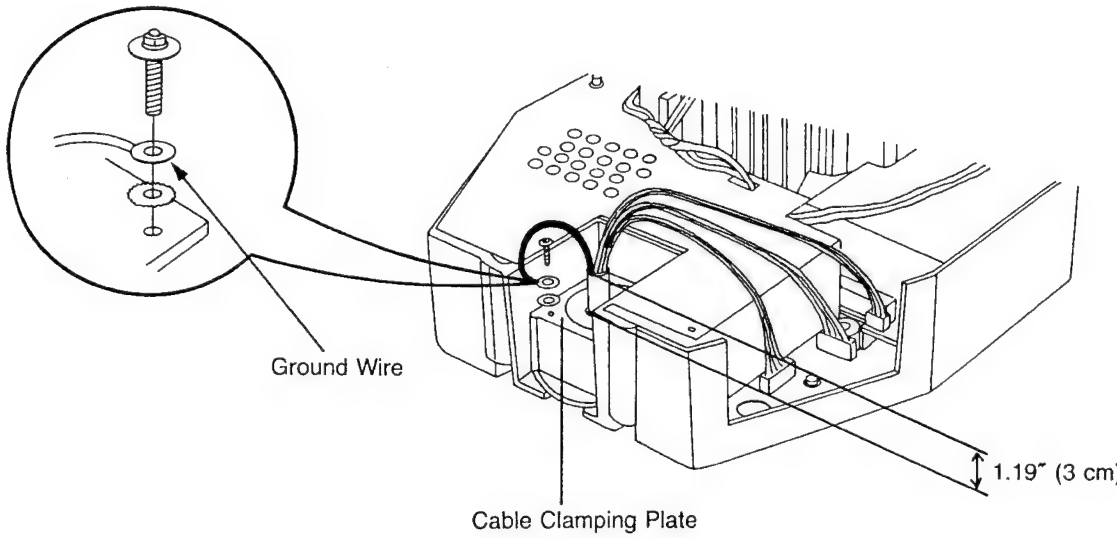


Fig. 12

NOTE:
Take care not to expose too much cable above the plate because it may be hit by the antenna.

10. Secure the cables with the plastic clamps.
The clamps are to prevent the cables from hitting the antenna.

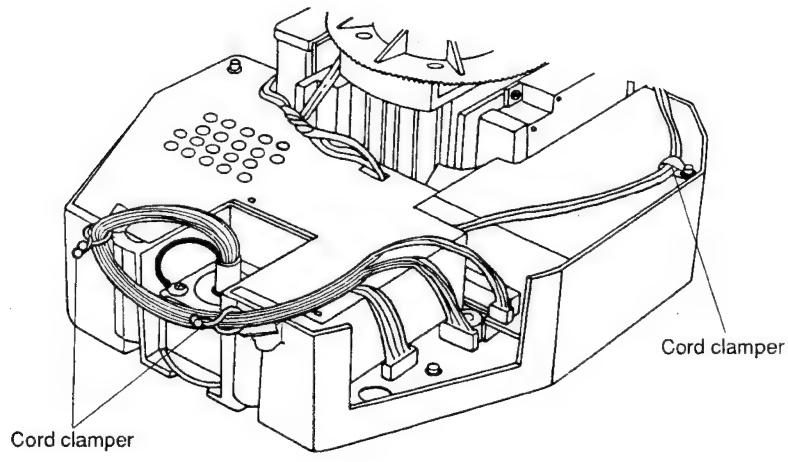


Fig. 13

11. Replace the antenna unit cover aligning the marks.
Tighten the bolts of the antenna unit cover temporarily. Secure them tightly after completing the Heading Adjustment (See page 57).

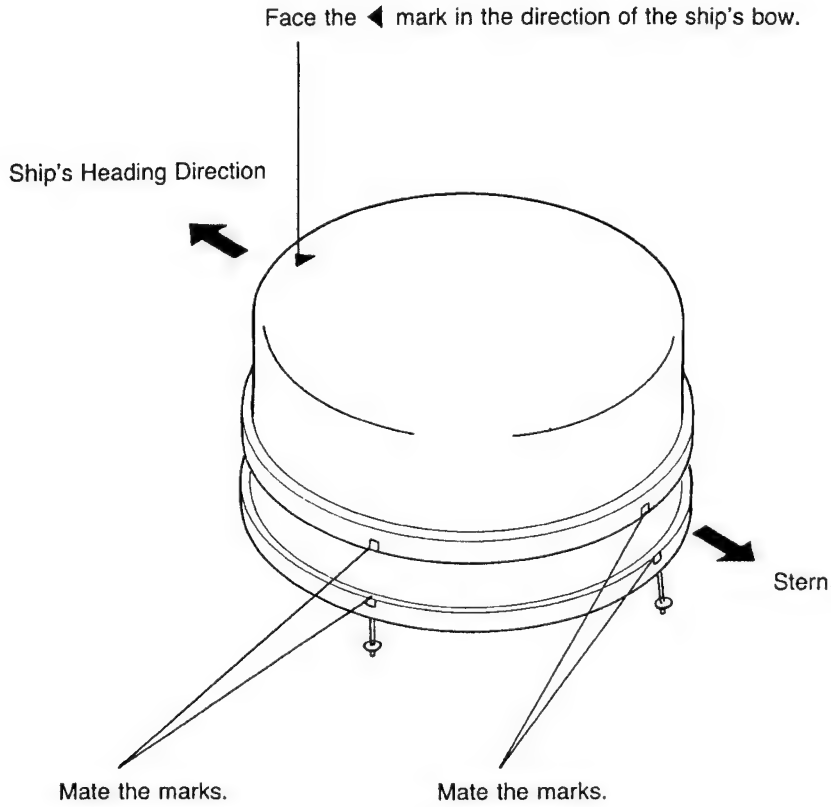


Fig. 14

Mounting the Main Unit

Mounting Procedure:

1. Mark five screw positions on the platform where the main unit is to be mounted using the template.

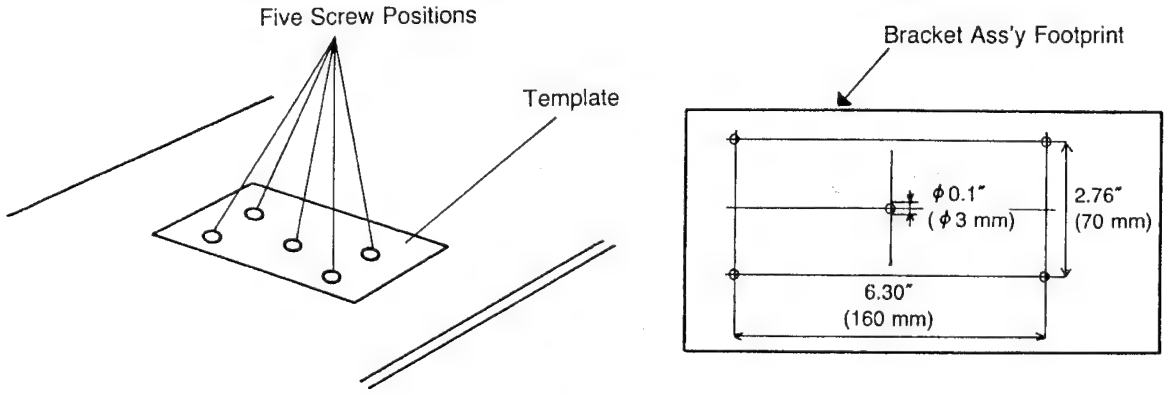


Fig. 15

2. Unfasten the knob bolts and remove the display unit (in the direction of the arrow) from the bracket ass'y.

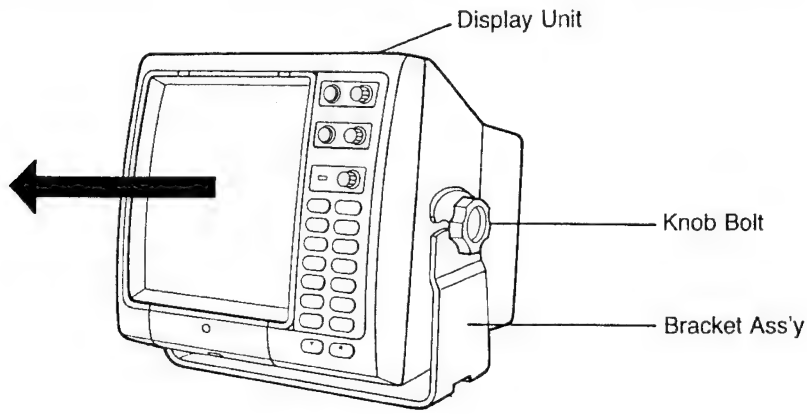


Fig. 16

3. Install the bracket ass'y on the surface using the five screws (included).

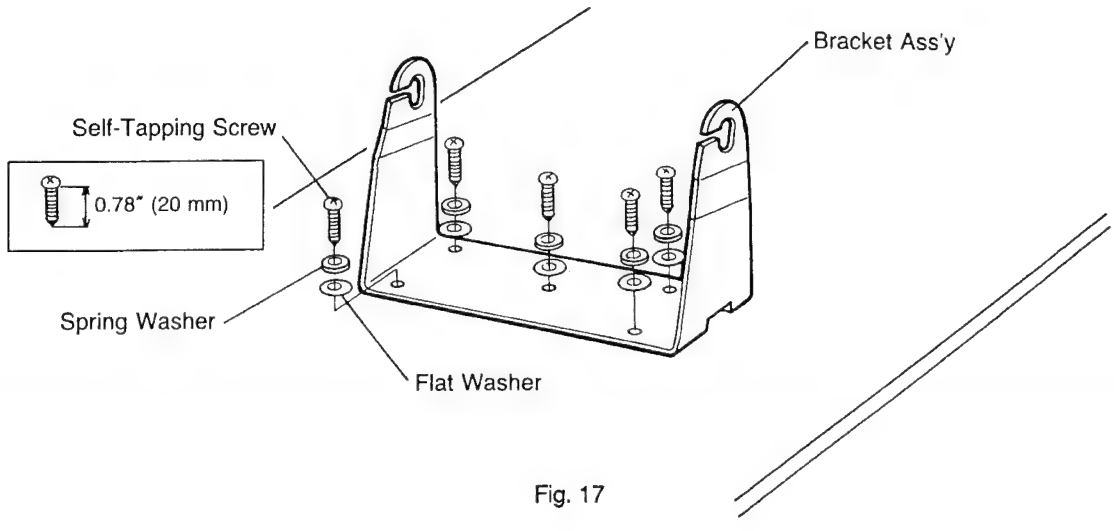


Fig. 17

4. Re-mount the main unit on the bracket ass'y.

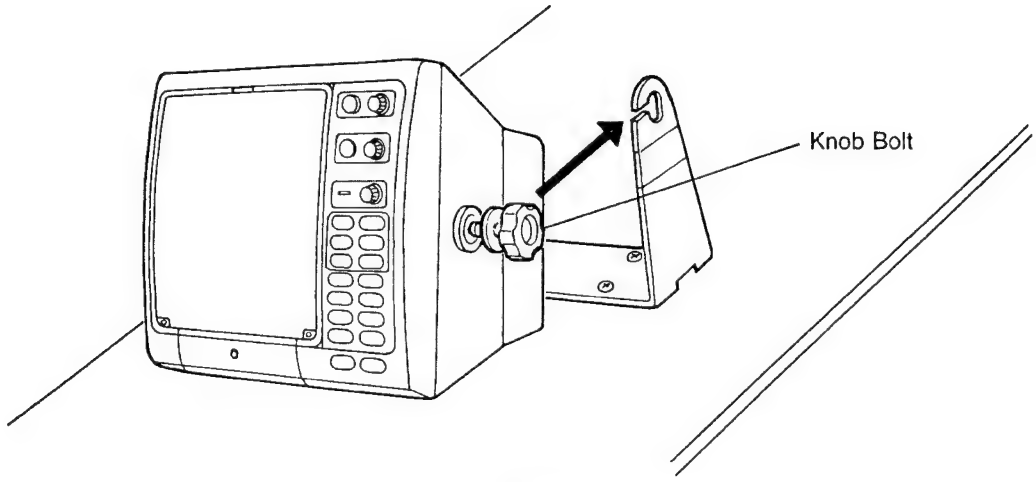


Fig. 18

Connection

CONNECTING PROCEDURE:

1. Connect the cable from the antenna unit to the back of the main unit.
Align the pins carefully.

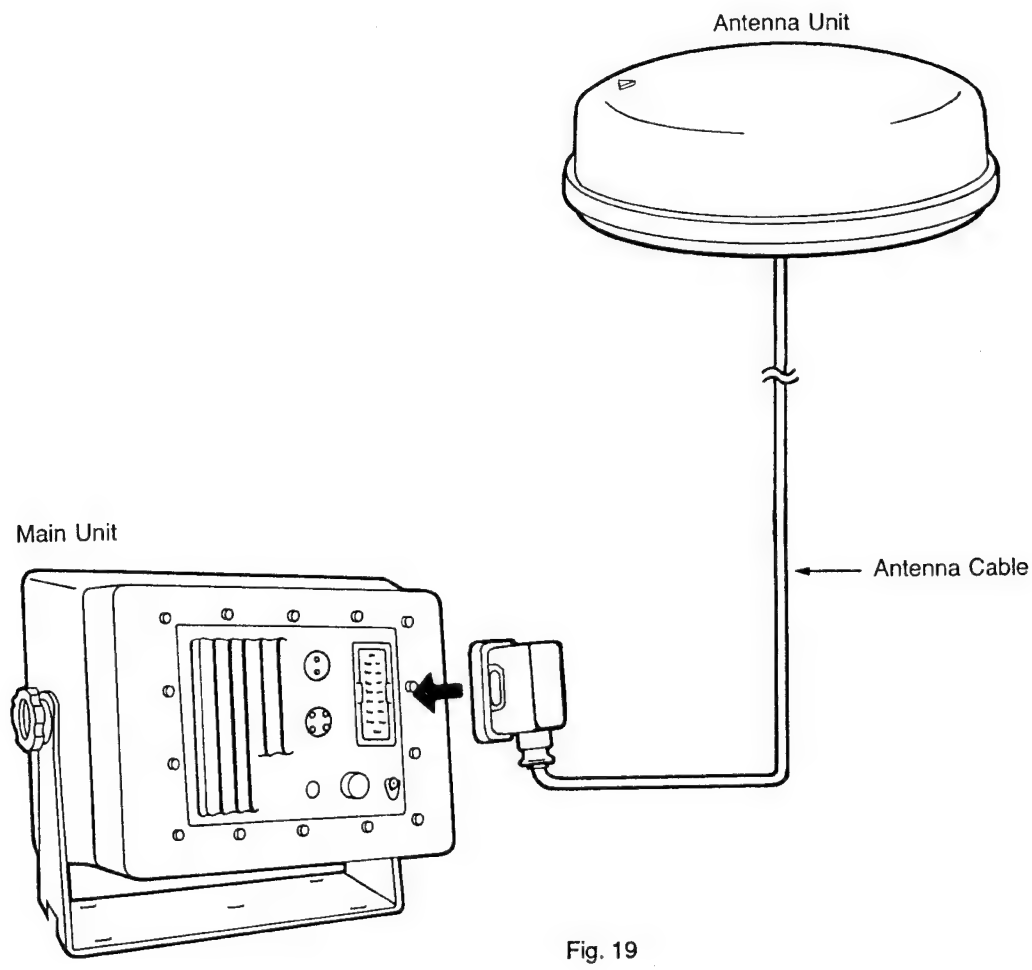


Fig. 19

2. Connect the ground wire to the ground terminal at the rear of the main unit and connect the other end to the ground on the vessel.

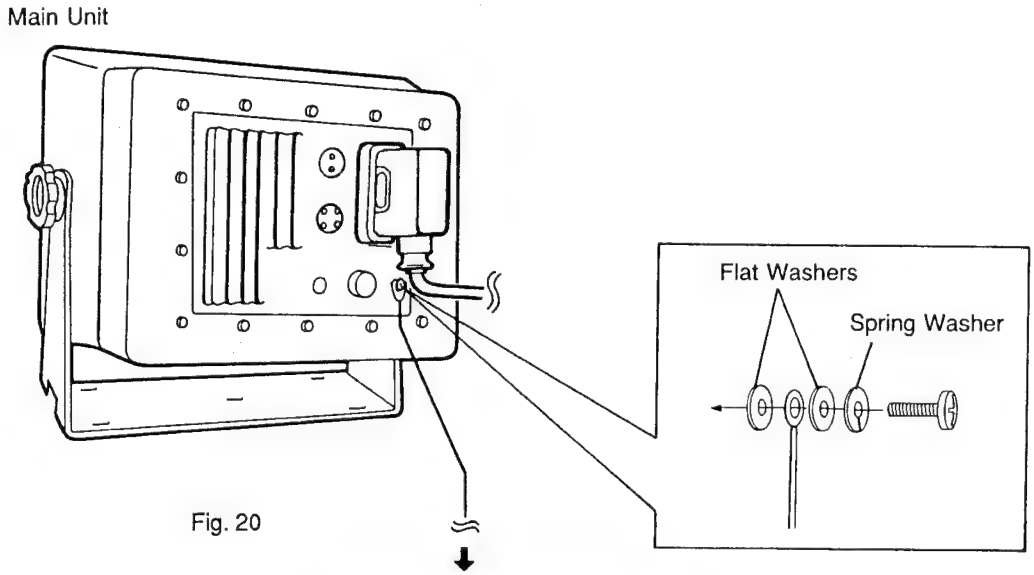


Fig. 20

3. Connect the power cable supplied to the DC IN jack at the rear of the main unit and connect the other end to the DC battery (10.8 to 42V DC) and to the earth ground on the vessel.

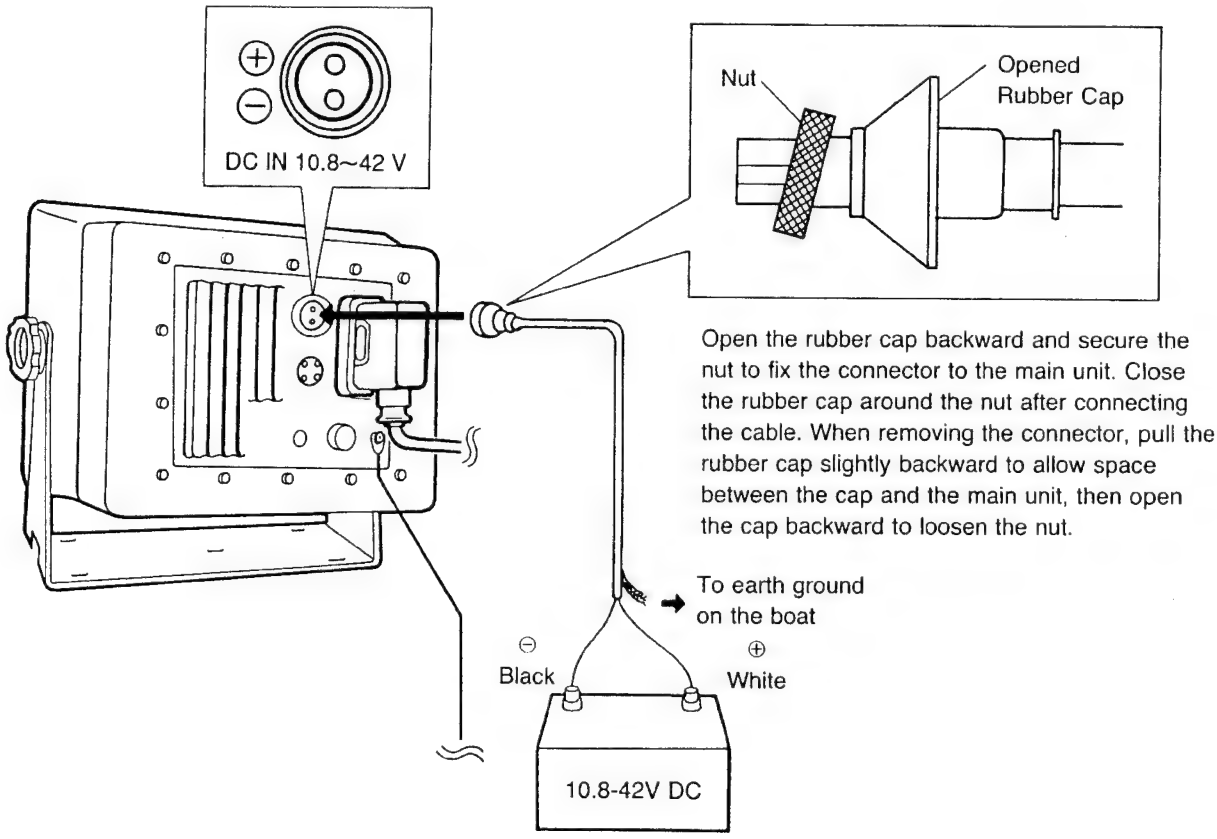
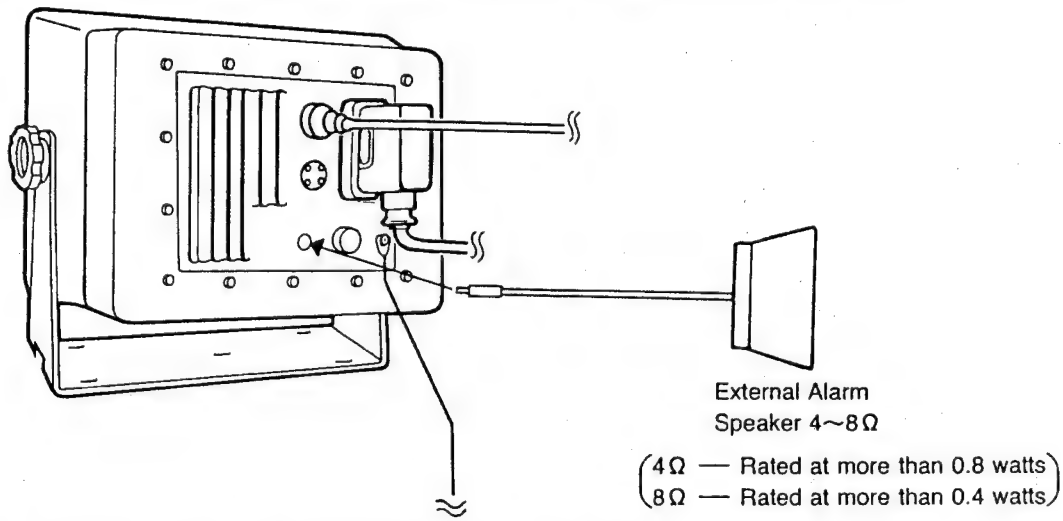


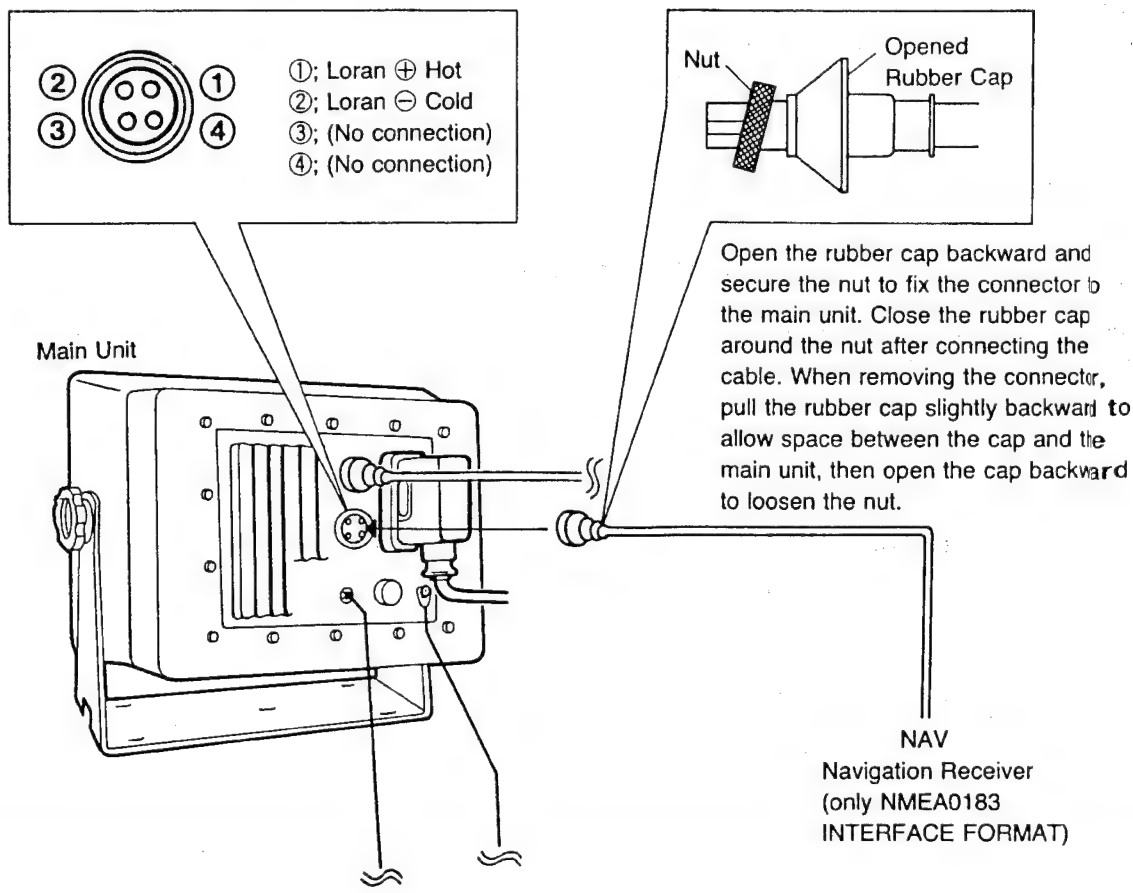
Fig. 21

Installation Diagram (cont.)

4. External alarm speaker (4 to 8 ohm) can be connected to the main unit.
Connect the cord from the external alarm speaker to the EXT SP jack at the rear of the main unit.



5. Navigation Receiver (NMEA 0183 interface format only) can be connected to the main unit.
Connect the cable from the Navigation Receiver to the NAV jack at the rear of the main unit.



OPERATIONS

Measuring the Target

MEASURING THE RANGE TO TARGET WITH VRM.	1 Each press of (VRM 1/2) to select VRM1 or VRM2 alternately. 2 Press (EBL/VRM ↓) or (EBL/VRM ↑) to move the VRM to the target. 3 Distance displays at the bottom right.
MEASURING THE TARGET BEARING WITH EBL.	1 Each press of (EBL 1/2) to select EBL1 or EBL2 alternately. 2 Press (EBL/VRM ↓) or (EBL/VRM ↑) to adjust the EBL to the targets. 3 Bearing dsiplays at the bottom left.

Setting the Alarm

1 SETTING THE RANGE	Press (VRM 1/2) to set an inner range and an outer range.
2 SETTING THE BEARING	Press (EBL 1/2) to set the right and left bearing limits.
3 SETTING THE ALARM ZONE	Press (ALARM / EBL) to set the smaller area of sphere encircled, for a larger area setting, the second press within 2 seconds of the first one.

Outline of Operation

1 THE POWER SOURCE TURNED ON.	Press (POWER ON) until beep is heard. Warm-up begins with indication of time and wait for 1 minutes 30 seconds.
2 STARTING TRANSMITTER.	Press (TX/STBY / [PUSH]) to start the transmitter.
3 CHANGING RANGE SCALE.	Press (▼ RANGE) or (▲ RANGE) to select the Radar Range.
4 ADJUSTING DISPLAY BRILLIANCE.	Press (BRILL / PNL DIM) to select an appropriate brilliance of display.
5 ADJUSTING RECEIVER GAIN.	Turn GAIN to make clear and distinct target images appear.
6 TUNING THE RECEIVER.	Turn TUNE to adjust the turning so as produce the clearest screen presentation.
7 ELIMINATING SEA CLUTTER OR RAIN/SNOW CLUTTER.	Turn A/C SEA or press (A/C RAIN / IR) to eliminate reflection echoes. According to the Sea and/or Weather conditions.

IMPORTANT NOTICE

If the transceiver module is placed on a steel workbench, great care should be taken to avoid deterioration of the magnetron mounted on the module. Follow the guidelines given in Fig. 24.

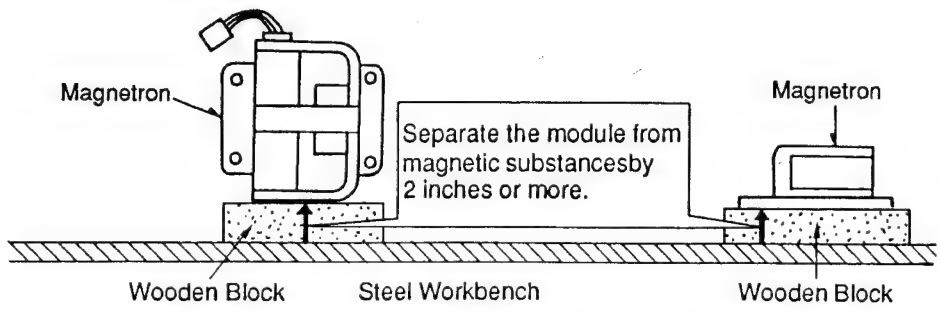


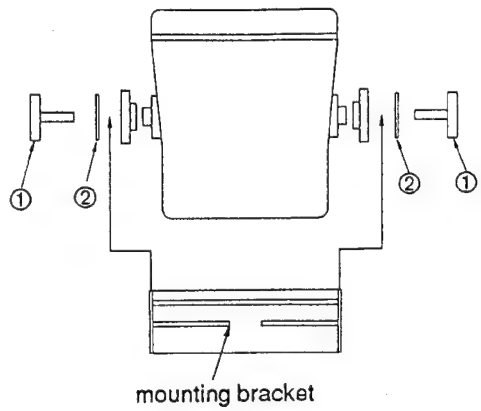
Fig. 24

DISASSEMBLY INSTRUCTIONS

MODEL KX-G8100MO

Ref. No. 1 HOW TO REMOVE THE MOUNTING BRACKET

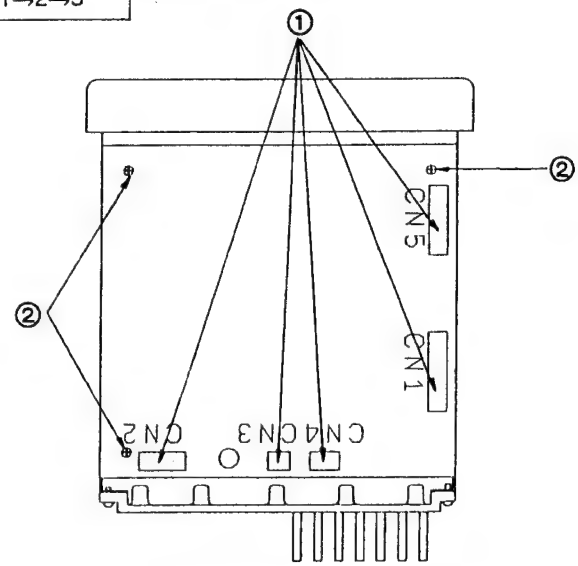
Procedure 1



1. Remove the knob bolts (①×2).
2. Remove the washers (②×2).
3. Remove the mounting bracket.

Ref. No. 3 HOW TO REMOVE THE SIGNAL PROCESSOR P.C.BOARD (PQUP1107ZA)

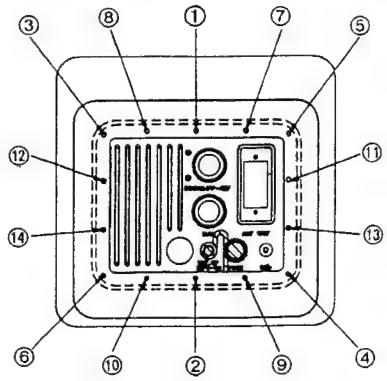
Procedure 1→2→3



1. Remove the connectors (①×5).
2. Remove the screws (②×3).

Ref. No. 2 HOW TO REMOVE THE REAR CABINET

Procedure 1→2

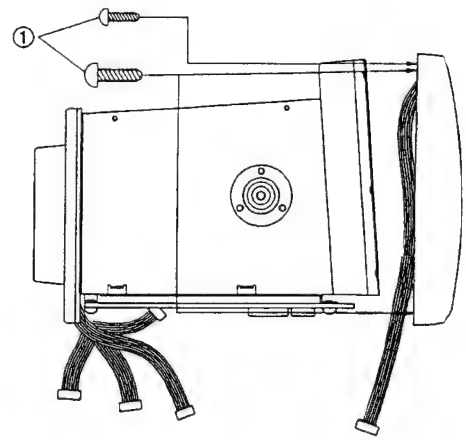


1. Remove the screws (①–⑭).

Note: **When assembling the rear cabinet, tighten the screws in the order shown.**

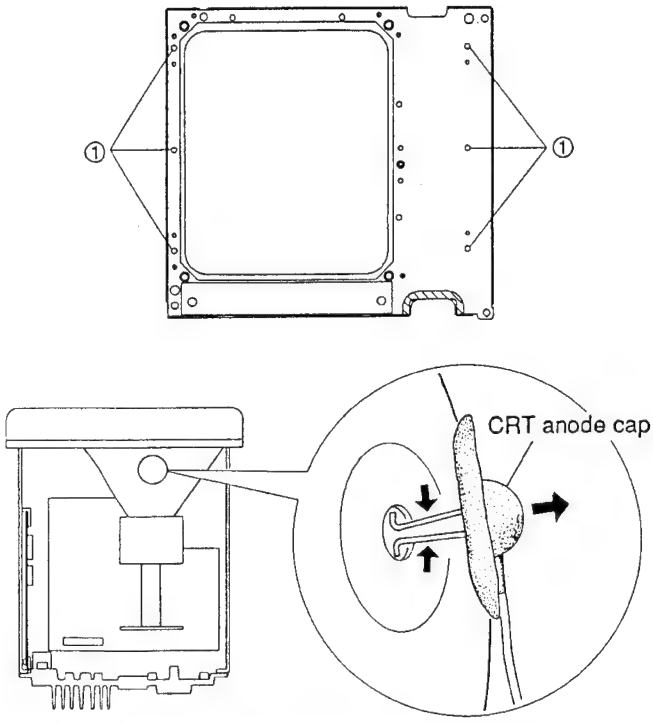
Ref. No. 4 HOW TO REMOVE THE FRONT CABINET

Procedure 1→4



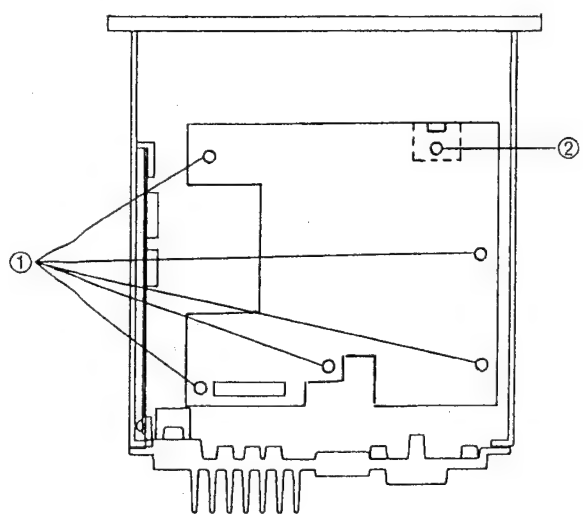
1. Remove the screws (①×6).

Ref. No. 5	HOW TO REMOVE THE CRT AND CHASSIS
Procedure 1→4→5	**Note: Power off and discharge the anode to ground before touching.**



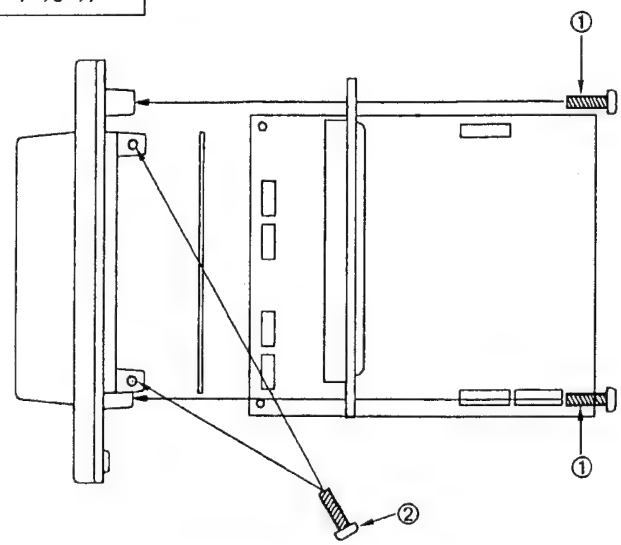
1. Remove the screws (①×6).
2. Remove the CRT anode cap as shown. (See note above)

Ref. No. 6	HOW TO REMOVE THE CRT CONTROL P.C.BOARD (PANP30935ZA OR PQUP828ZA)
Procedure 1→5→6	



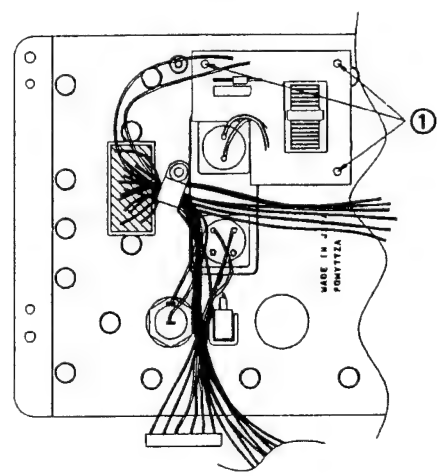
1. Remove the screws (①×5).
2. Remove the screw (②×1).

Ref. No. 7	HOW TO REMOVE THE POWER SUPPLY P.C.BOARD (PQUP1097ZA-a)
Procedure 1→6→7	



1. Remove the screws (①×2).
2. Remove the screws (②×2).

Ref. No. 8	HOW TO REMOVE THE POWER SUPPLY P.C.BOARD (PQUP1097ZA-b)
Procedure 1→5→8	

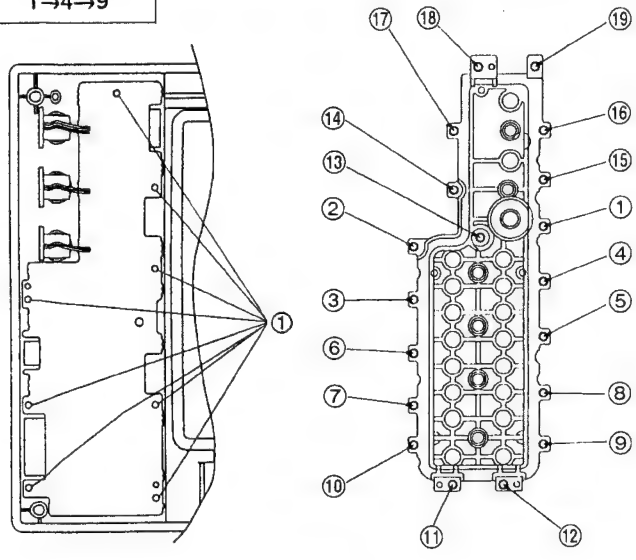


1. Remove the screws (①×3).

MODEL KX-G8100DM

Note: Use non-magnetic screwdrivers when working inside the transmitter unit to avoid damage to the magnetron.

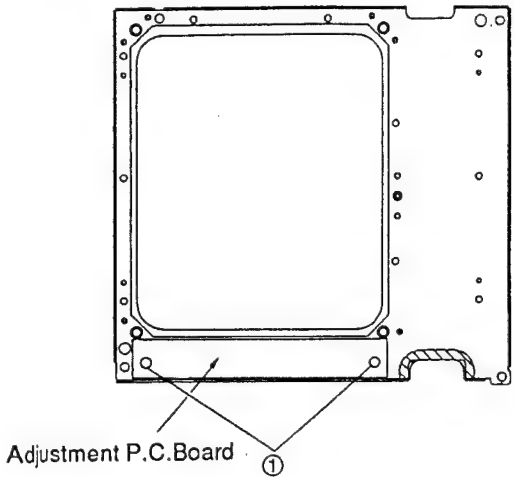
Ref. No. 9	HOW TO REMOVE THE OPERATION P.C.BOARD (PQUP1098ZA) AND KEY BUTTON
Procedure 1→4→9	



1. Remove the screws (①×8).
2. Remove the screws (①~⑲).

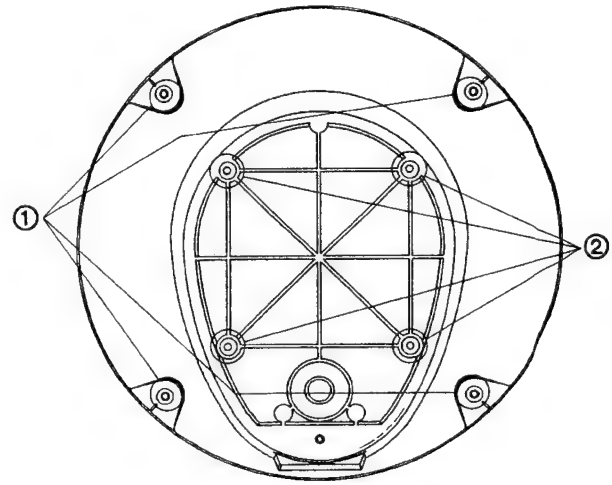
Note: When assembling the key button, tighten the screws in the order shown.

Ref. No. 10	HOW TO REMOVE THE ADJUSTMENT P.C.BOARD
Procedure 1→4→10	



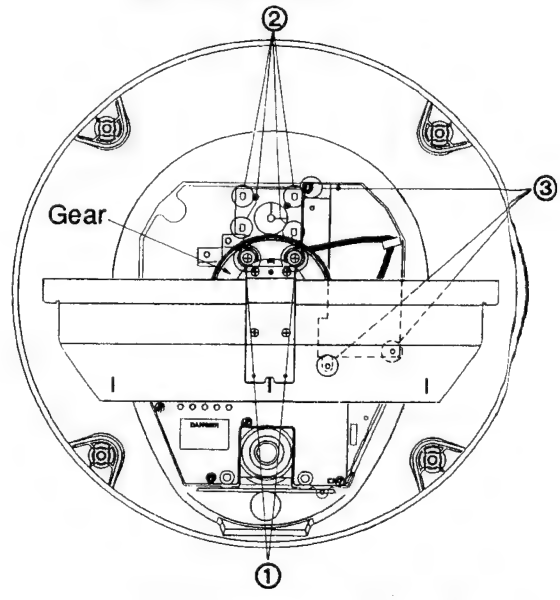
1. Remove the screws (①×2).

Ref. No. 1	HOW TO REMOVE THE RADOME COVER
Procedure 1	



1. Remove the bolts (①×4).
2. Remove the bolts and washers (②×4).

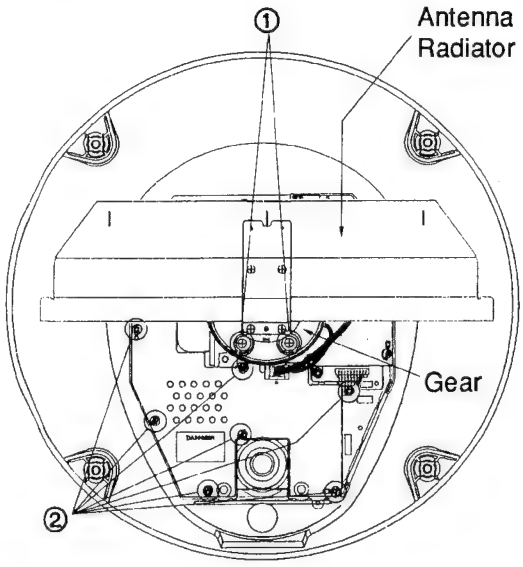
Ref. No. 2	HOW TO REMOVE THE ANTENNA DRIVING UNIT, MOTOR AND RECEIVER P.C. BOARD COVER
Procedure 1→2	When removing the antenna driving unit, it is necessary to remove the screws ① of ref. No. 2 and ref. No. 3.



1. Set the holes of gear as above figure.
2. Remove the screws (①×2).
3. Remove the screws (②×4).
4. Remove the screws (③×3).

Ref. No. 3	HOW TO REMOVE THE ANTENNA DRIVING UNIT AND TRANSMITTER P.C. BOARD COVER
Procedure 1→2→3	

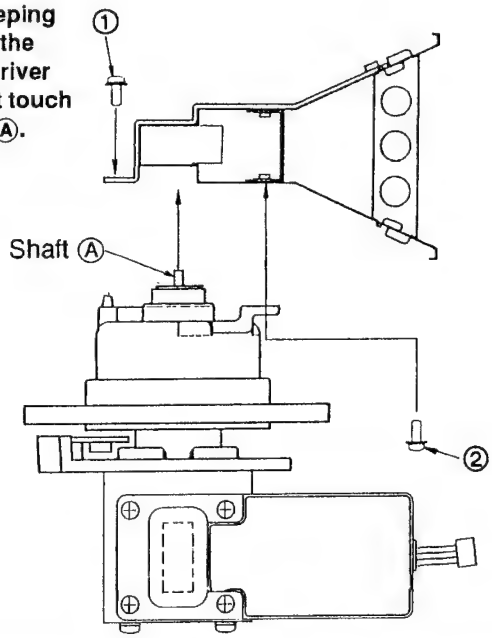
Turn the antenna radiator to 180 degrees from ref. No. 2 on page 19.



1. Set the holes of gear as above figure.
2. Remove the screws (①×2).
3. Remove the screws (②×7).

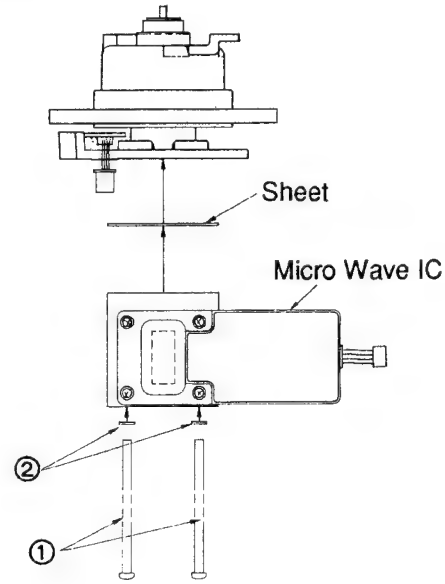
Ref. No. 4	HOW TO REMOVE THE ANTENNA RADIATOR
Procedure 1→2→3→4	

As the keeping quality of the antenna driver unit, don't touch the shaft Ⓐ.



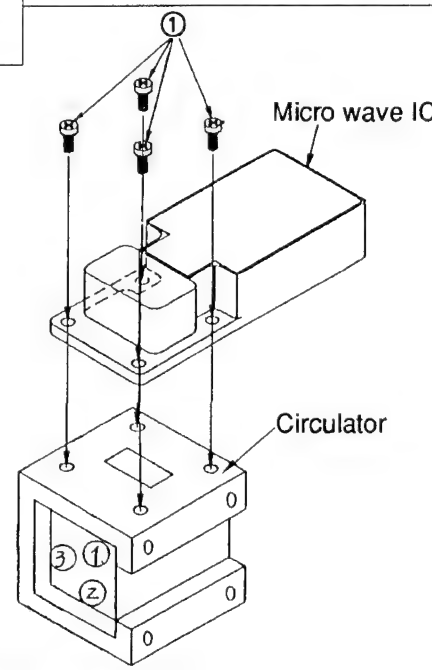
1. Remove the screws (①×2).
2. Remove the screws (②×2).

Ref. No. 5	HOW TO REMOVE THE MICRO WAVE IC
Procedure 1→2→3→4→5	



1. Remove the Screws (①×4).
2. Remove the spring washers (②×4).

Ref No. 6	HOW TO REMOVE THE CIRCULATOR
Procedure 1→2→3→4→ 5→6	

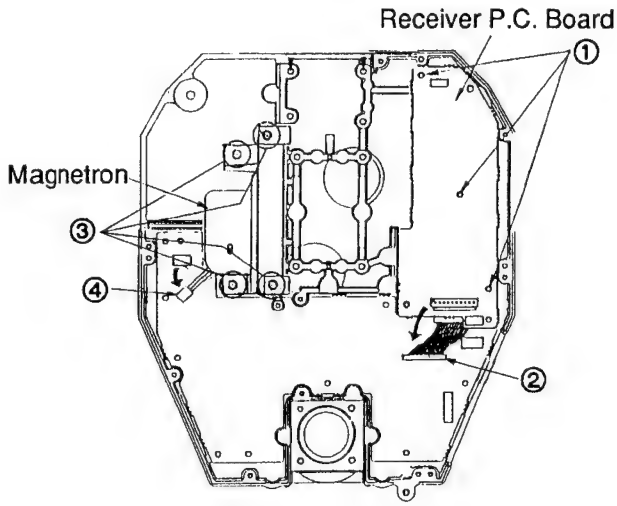


1. Remove the screws (①×4).

Note: When assembling the circulator and micro wave IC, be careful the direction of circulator (Refer to above figure).

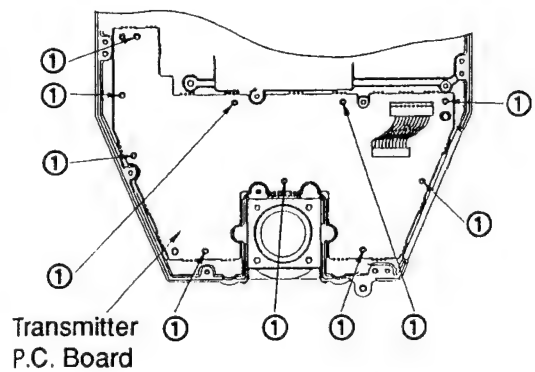
Ref. No. 7	HOW TO REMOVE THE RECEIVER P.C. BOARD (PQUP1005ZA-b) AND MAGNETRON
Procedure 1→2→3→4→7	

Note: Use non-magnetic screwdrivers only.



1. Remove the screws (①×3).
2. Remove the connector (②×1).
3. Remove the screws (③×4).
4. Remove the connector (④×1).

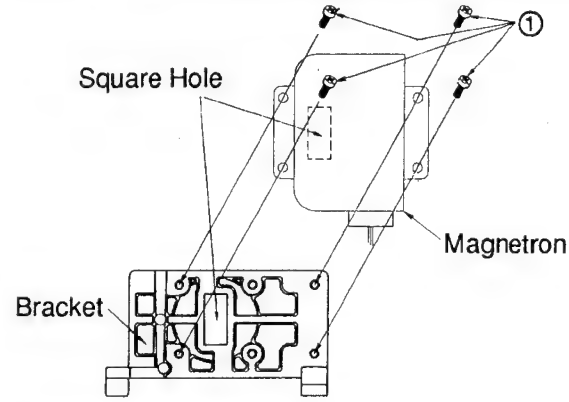
Ref. No. 8	HOW TO REMOVE THE TRANSMITTER P.C. BOARD (PQUP1005ZA-a)
Procedure 1→2→3→4→ 7→8	



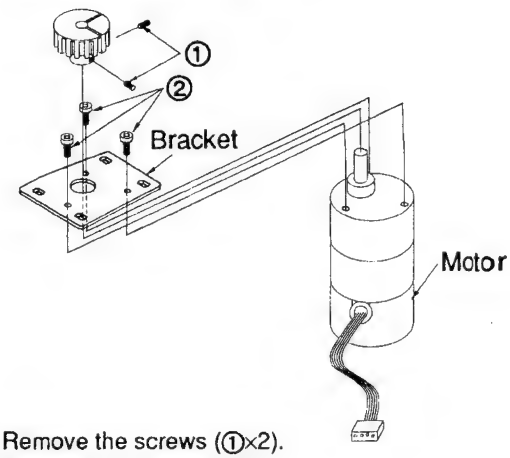
1. Remove the screws (①×10).

Ref. No. 9	HOW TO REMOVE THE MAGNETRON AND MOTOR
Procedure 1→2→3→4→ 5→9	

Note: Use non-magnetic screwdrivers only.

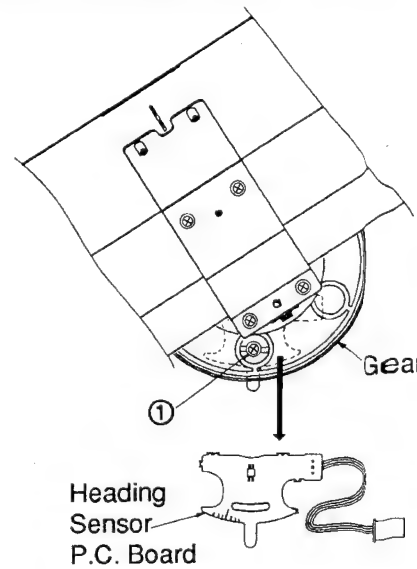


1. Remove the screws (①×4).



1. Remove the screws (①×2).
2. Remove the screws (②×3).

Ref. No. 10	HOW TO REMOVE THE HEADING SENSOR P.C. BOARD
Procedure 1→10	



1. Set the holes of gear as above figure.
2. Remove the screw (①×1).

WATER RESISTANT CHECK POINTS

First, check for wear, damage, or any sign of leakage of each rubber parts using the following table.
Especially bold the faces are important checking points.

Model KX-G8100MO

Leaky Point	Check Point
Rubber Gasket (14) and Rear Cabinet (1)	Is rubber gasket (14) protruding and/or twisted?
	Are fourteen screws tightened firmly?
Antenna Cable Jack (39)	Are two screws tightened firmly?
Power Supply Jack (36)	Is nut tightened firmly?
Loran Interface Jack (37)	Is nut tightened firmly?
Fuse Holder (42)	Is nut tightened firmly?
Rubber Cap (32)	Is rubber cap (32) missing and/or twisted, or not?
Chassis (65) and Heat sink (33)	Are two screws tightened firmly?
Operational P.C.Board (PWB2) and Puch Switch (43)	Are nineteen screws tightened firmly?
	Are push switches (43) protruding and/or twisted?
CRT and Chassis (66)	Are four screws tightened firmly?
Front Cabinet (2) and Chassis (66)	**Are four screws tightened firmly?**
Rubber Gasket (12)	Is rubber gasket (12) protruding and/or twisted, or not?
Variable Controls	Are nuts (28) tightened firmly?
Rubber Cover (13)	Is rubber cover (13) missing and/or twisted, or not?

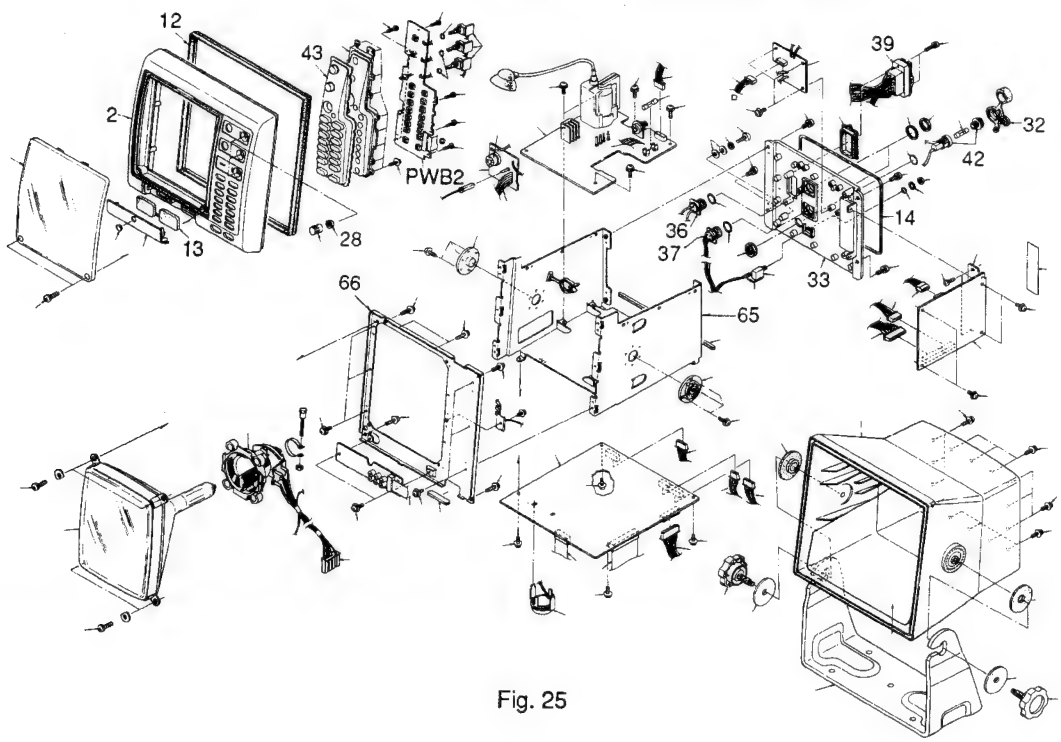


Fig. 25

Model KX-G8100DM

Especially bold type faces are important checking points.

Leaky Point	Check Point
Radome Upper Cover (1) and Radome Base (2)	**Are four bolts tightened firmly?**
Rubber Gasket (11)	**Is rubber gasket protruding and/or twisted, or not?**
Antenna Cable Bushing (16)	Are four screws tightened firmaly?

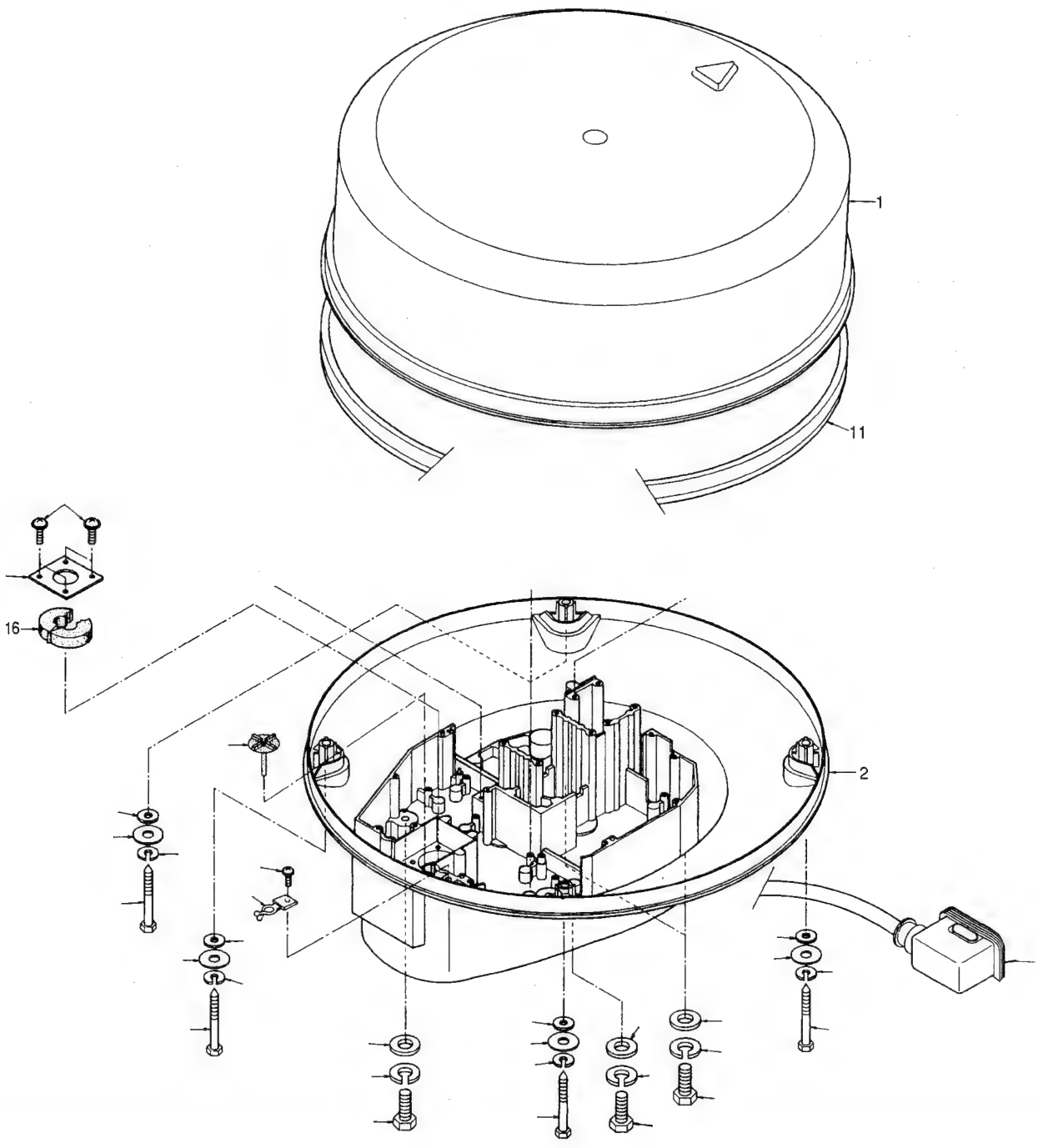


Fig. 26

MAINTENANCE

General

The radar system should maintain optimum performance for a reasonably long period of time. Factory adjustment or alignment of circuits does not require frequent readjustments and realignments. However, continued performance can not be expected without periodic inspection and maintenance.

Periodically, a thorough inspection of the equipment should be made. Cable connections at terminal boards and connectors should be kept clean and tight. Be sure all ground connections are secure and properly grounded. Arrange all wires and cables in orderly manner to prevent the possibility of arc- over or short. Replace all wires that show signs of corrosion, cracking or deterioration.

All units of the equipment should be kept clean and free from corrosion. Replace all missing knobs and defective or broken parts. Housing, shields, covers and other protective devices should be at their proper place and secured.

Cleaning and Lubrication

Cleaning lengthens the operating life of the equipment. Dirt on components can result in shortcircuits. A dry, soft cloth and soft bristled brush are recommended for removing dirt from the outside of the unit. Dirt on the inside of the unit should be removed with a softbristled brush and removed by using a vacuum cleaner.

Hardened dirt should be removed by using a mild detergent and water solution on a cotton-tipped swab or a soft cloth. Avoid excessive use of water. Do not allow water to penetrate any parts. Avoid the use of abrasives and chemical agents.
Corroded areas should be cleaned with a neutralizing solution of 2% borax and water to prevent further corrosion.

CAUTION:
After cleaning, the sets should be carefully inspected for defects such as poor connections, damaged parts and loosened mechanical parts.

Keep all moving parts properly lubricated, using a cleaning type lubricant on shaft bushings. Do not over lubricate.

Apply grease to the fixing bolts securing the upper radome cover everytime the cover is opened.

Before maintenance work, be sure to remove the antenna cable connector from the display unit. When checking inside the units, wait for a few minutes until the high voltage compnents (CRT or HV capacitors) can discharge the residual charge.

Interval	Item	Check / Measures	Remarks
3 to 6 months	Exposed bolts and nuts on antenna unit	Check for corroded or loosened bolts/nuts. If necessary, clean them and repaint thickly. Replace them with new ones if heavily corroded.	* Sealing compound may be used instead of paint. * Put slight amount of grease if bolts and nuts are replaced. * Do not paint the radome.
	Radome	Check for dirt or crack on the radowe. Thick dirt should be wiped off by using a soft cloth immersed in fresh water. If any crack is found, apply slight amount of sealing compound or adhesive as first-aid treatment, then call for repair.	* Do not use plastic solvent (thinners or acetone) for cleaning. * Do not paint the radome.

Interval	Item	Check / Measures	Remarks
3 to 6 months	Connectors of P.C. Board in the antenna unit (Fig. 27)	Open upper radome cover to check connectors connections inside. Also check if the rubber gasket on the radome is in good order.	* When putting cover back in position, do not pinch flying wires.
	CRT screen	Dirt on this creates symptoms identical to poor sensitivity. Clean CRT surface, using special care not to scratch it.	* Use a soft cloth with a slight amount of anti-static-charge spray. Never apply plastic solvent.
6 months to 1 year	CRT anode and approach (Fig. 28)	High tension on the CRT attracts dust from the environment, and moist dust will cause poor insulation. Clean high voltage parts as follows. 1. Pull out anode cap and touch its nipple to chassis (discharging). 2. Clean CRT side and anode cap/lead using a soft dry cloth.	*If a crack is found on rubber cap or wire sheath, replace cap or wire with new one. *Always make sure anode cap is put back on CRT after cleaning.
	Connectors of P.C. Board in the main unit.	Check for loose connections. Clean contacts or replace plug, if necessary.	

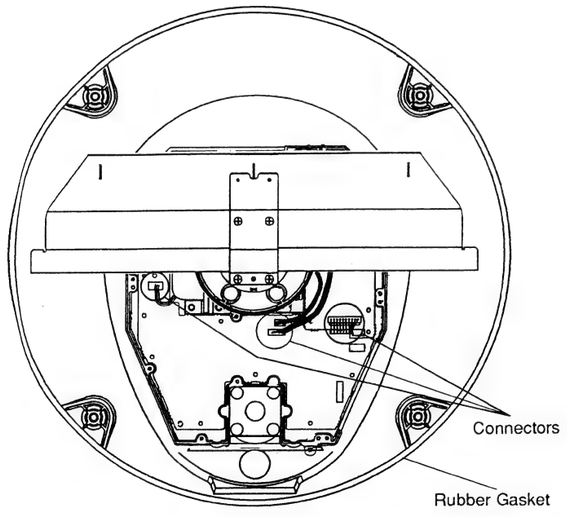


Fig. 27

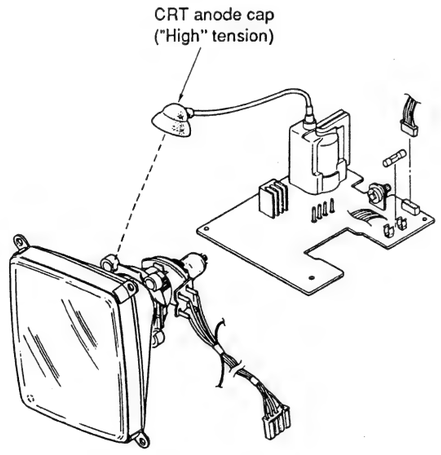


Fig. 28

WIRING CONNECTION DIAGRAM
INTERCONNECTION DIAGRAM

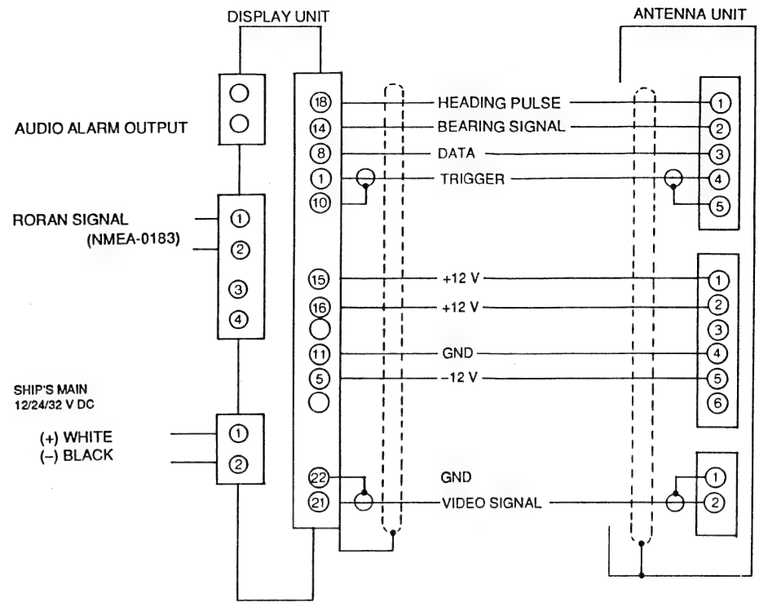


Fig. 29

WIRING CONNECTION DIAGRAM
ANTENNA UNIT

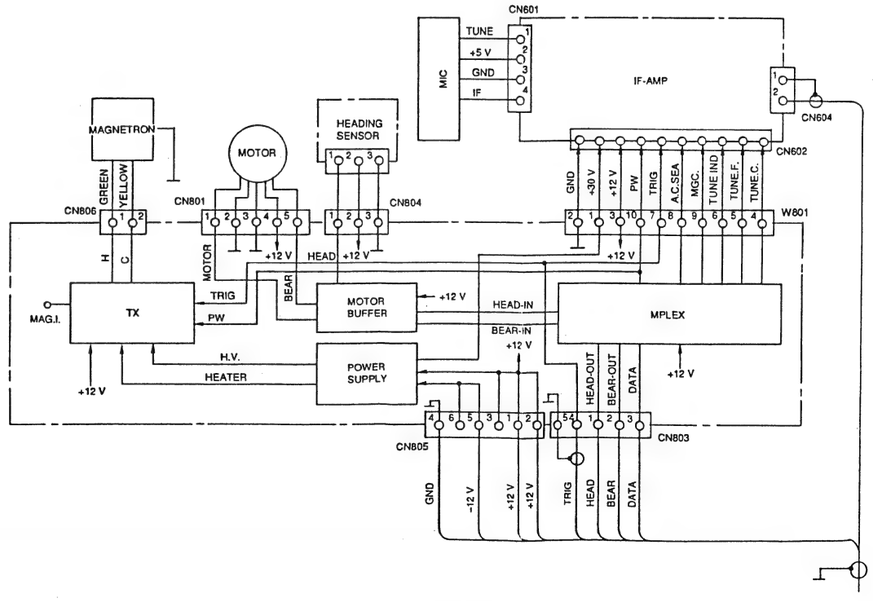
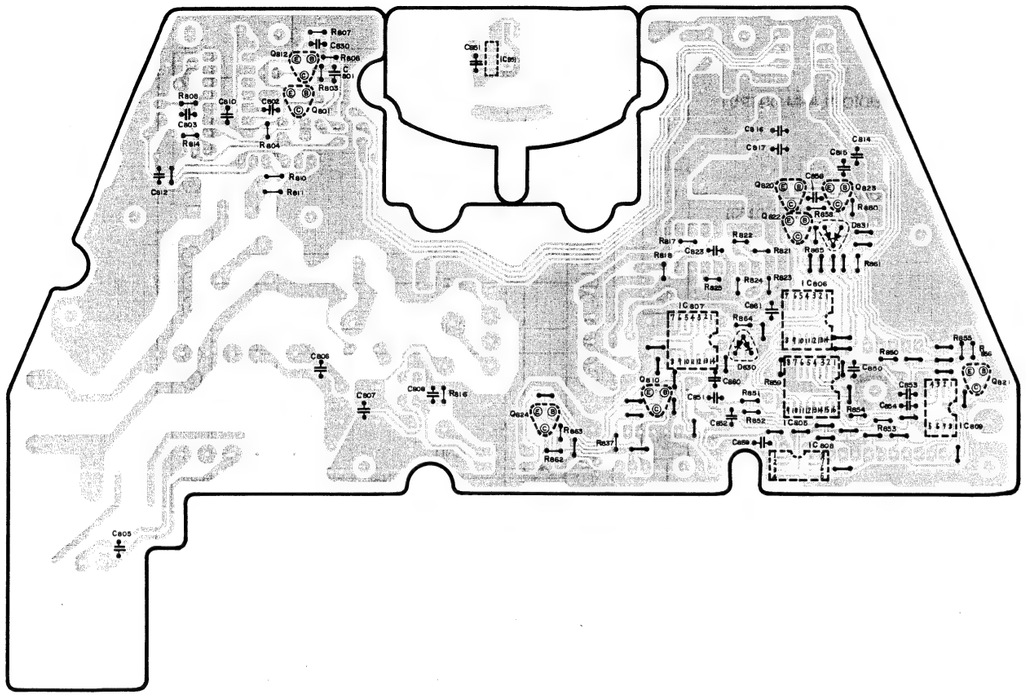


Fig. 30

CIRCUIT BOARD (PQUP1005ZA-A)

Transmitter P.C. Board

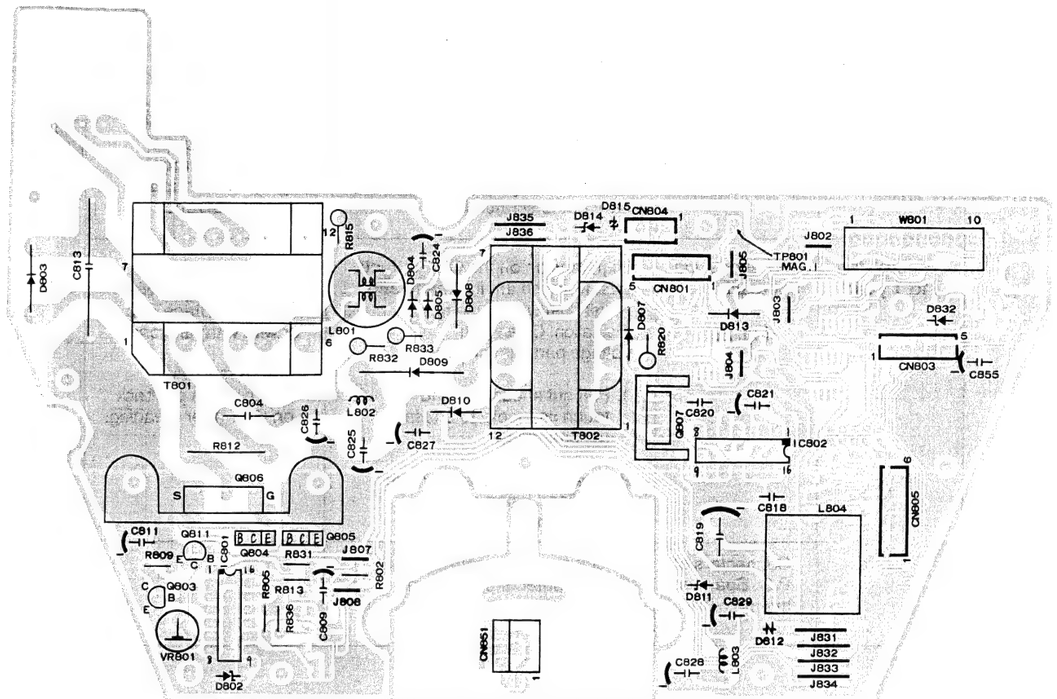
(Flow Solder Side View)



CIRCUIT BOARD (PQUP1005ZA-A)

Transmitter P.C. Board

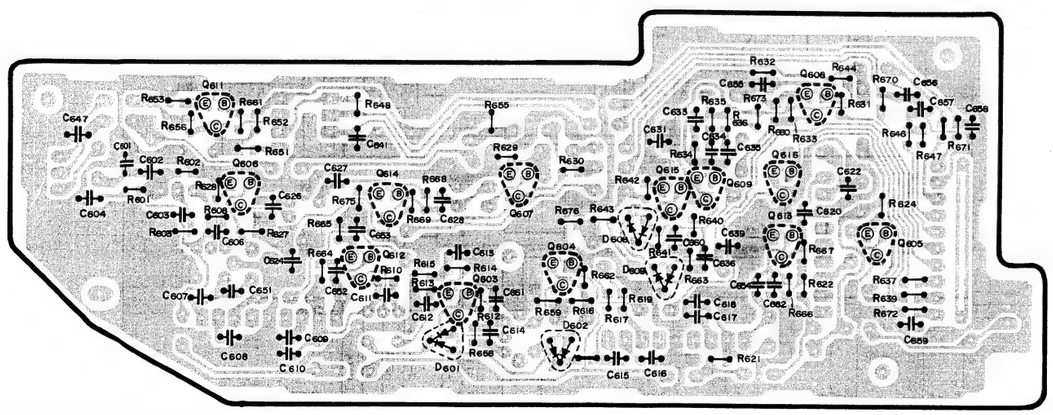
(Component View)



CIRCUIT BOARD (PQUP1005ZA-B)

Receiver P.C. Board

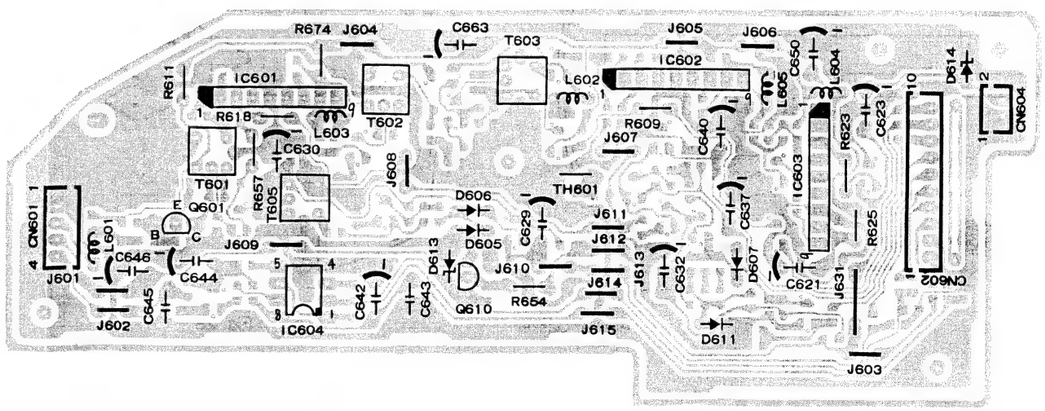
(Flow Solder Side View)



CIRCUIT BOARD (PQUP1005ZA-B)

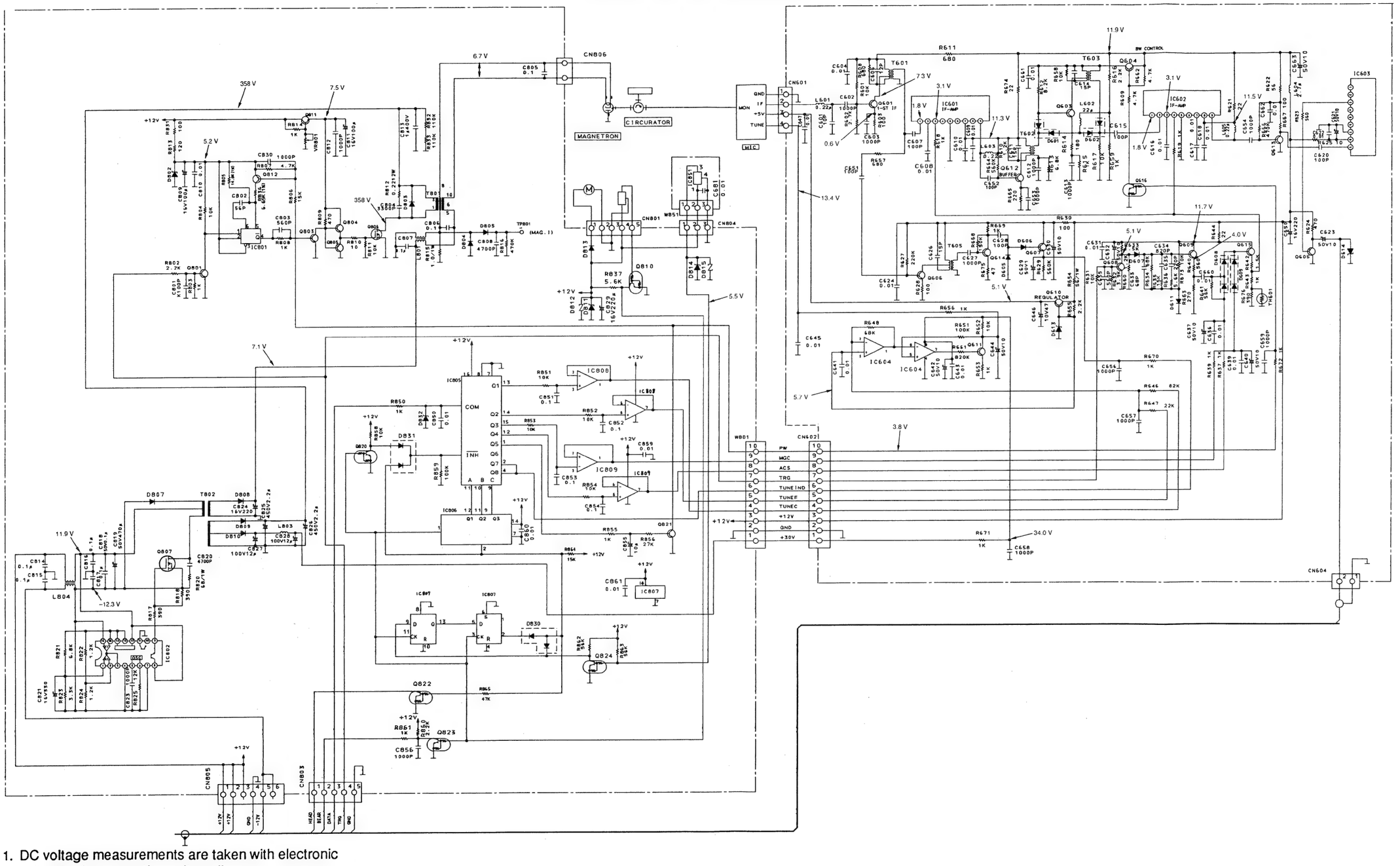
Receiver P.C. Board

(Component View)



SCHEMATIC DIAGRAM (PQUP1005ZA-A, 1005ZA-B)

Transmitter and Receiver P.C. Board



Note: 1. DC voltage measurements are taken with electronic voltmeter from negative voltage line.
Unit condition:
- Range 4NM
- Standby mode
- Turn the antenna radiator to 360°degrees.
- Adjust VR 151~156 so that the voltages at connector (CN602) are level as shown figure right.

TUNE C. = 4.0 V	MGC = 8.3 V
TUNE F. = 3.0 V	A.C.SEA = 6.8 V

This schematic diagram may be modified at any time with the development of new technology.

WIRING CONNECTION DIAGRAM

DISPLAY UNIT

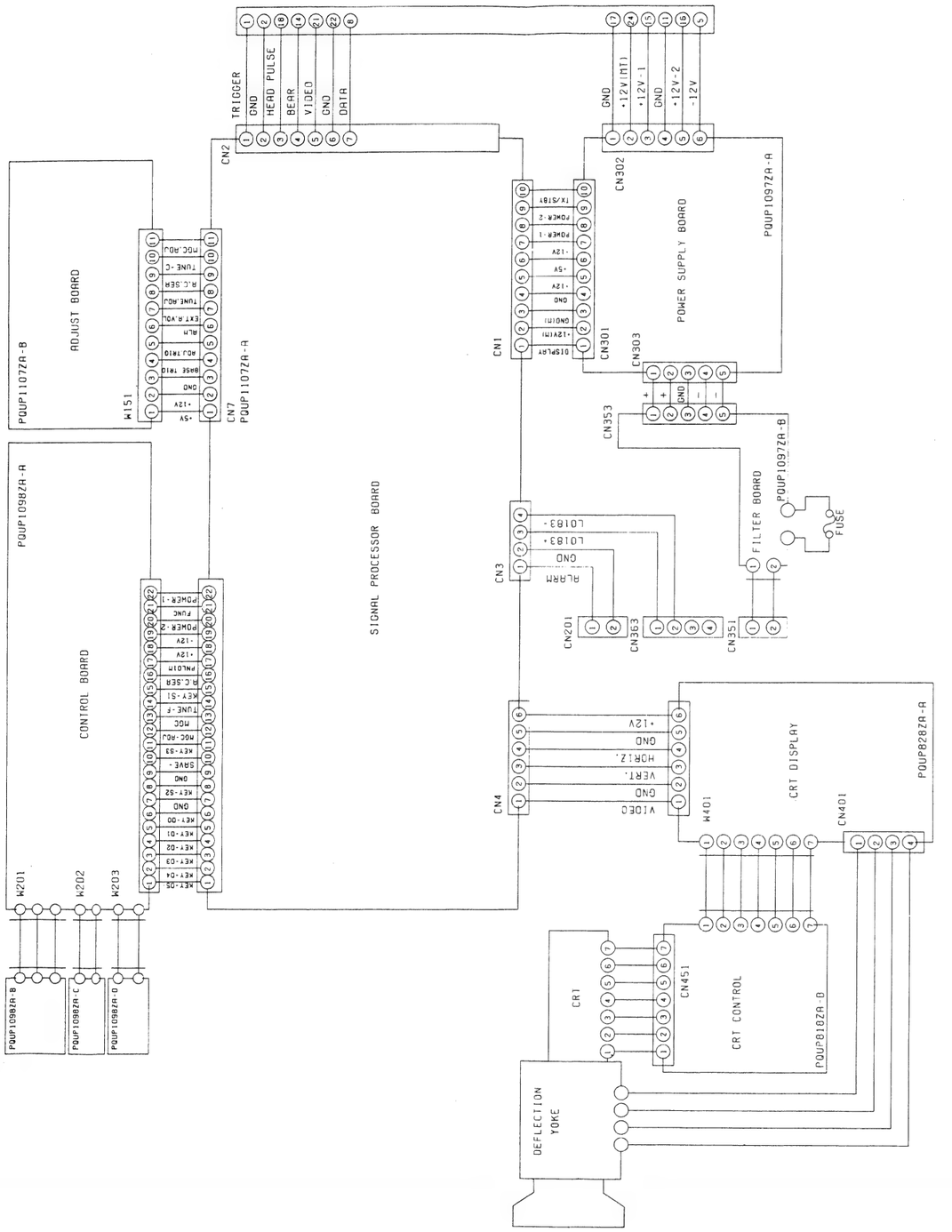
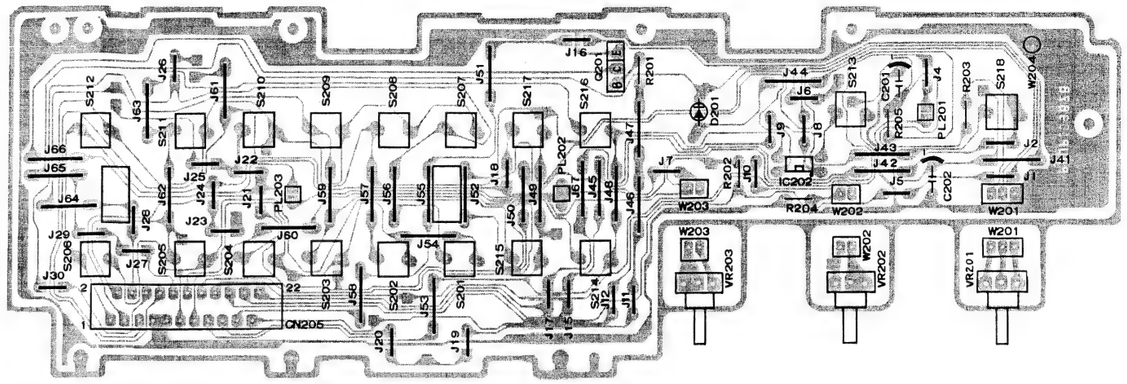


Fig. 31

CIRCUIT BOARD (PQUP1098ZA)

Operational P.C. Board

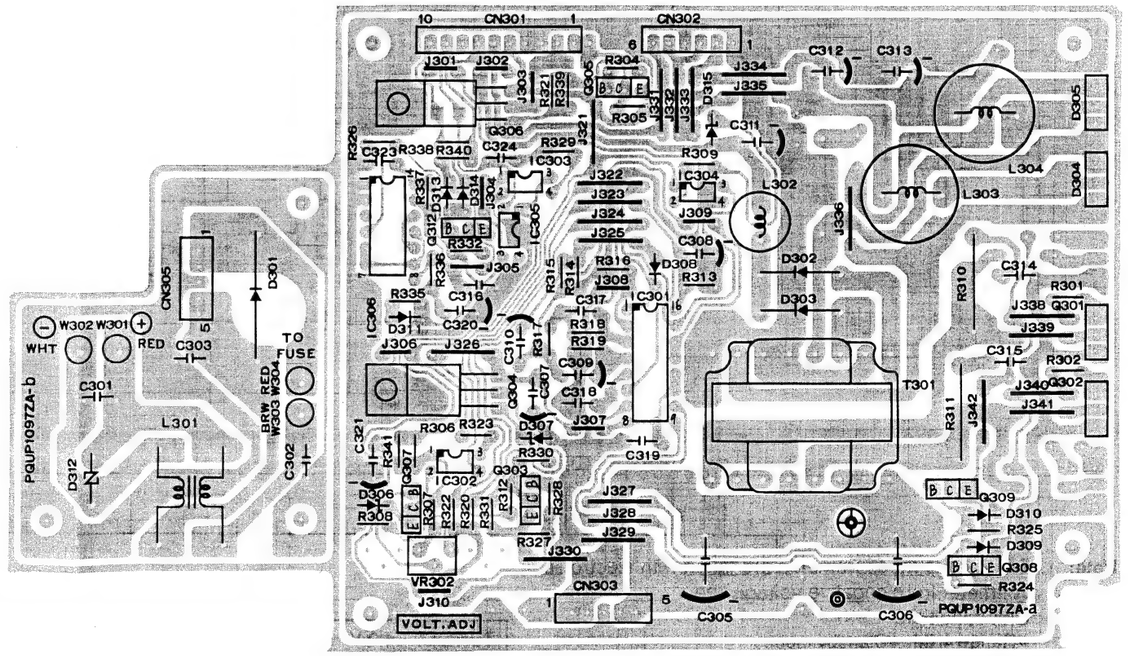
(Component View)



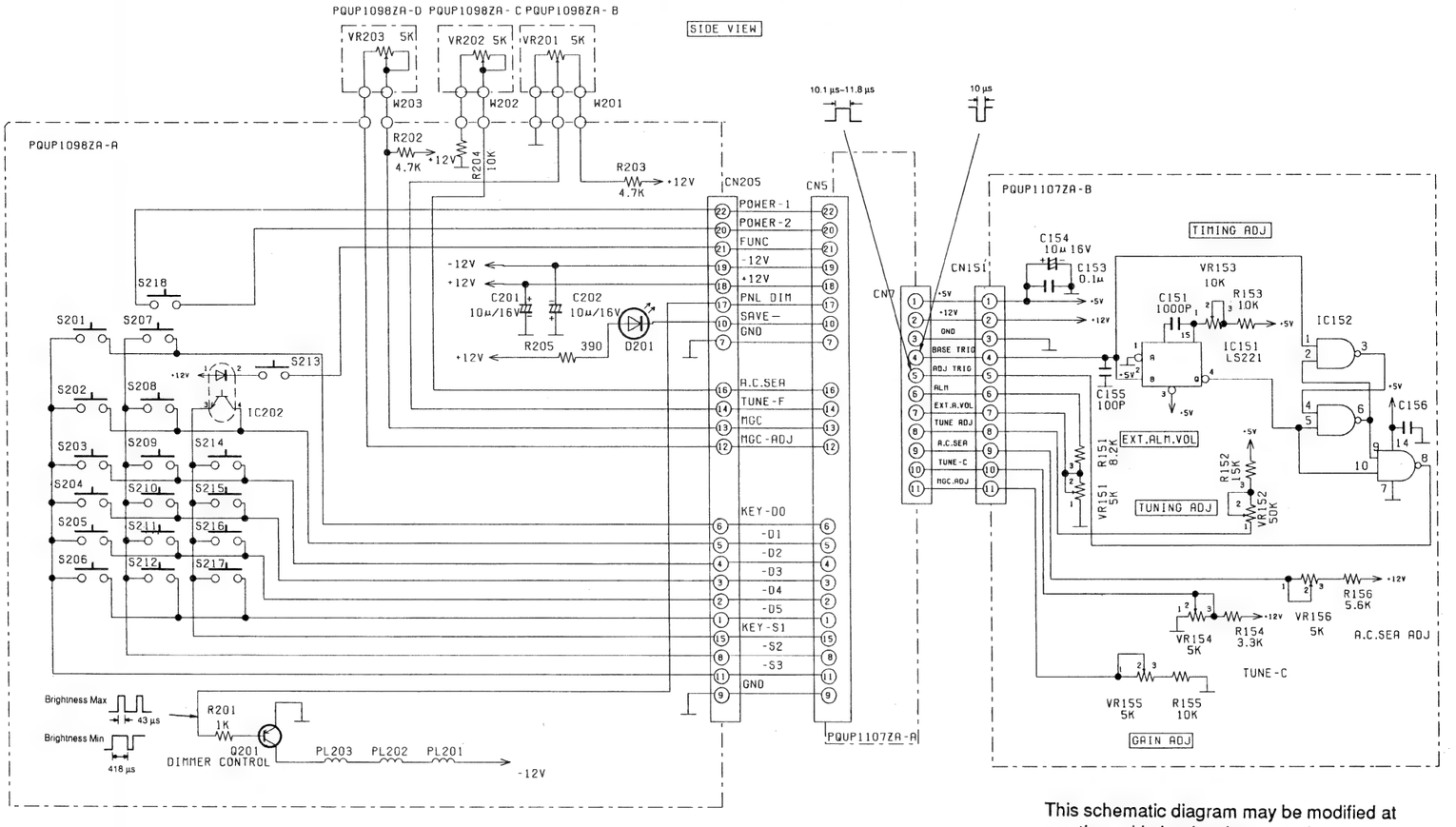
CIRCUIT BOARD (PQUP1097ZA)

Power Supply P.C. Board

(Component View)



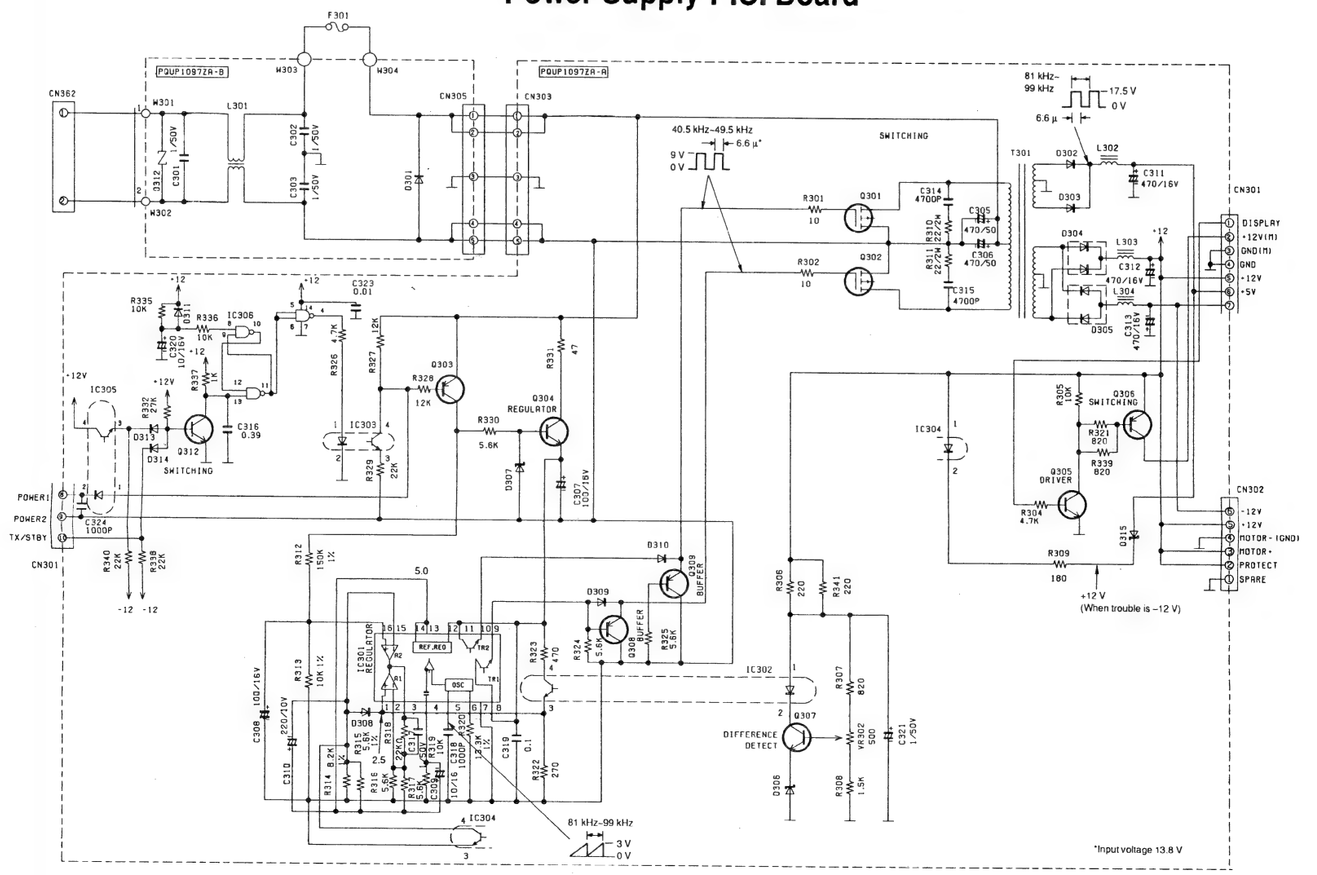
SCHEMATIC DIAGRAM (PQUP1098ZA, PQUP1107ZA)



This schematic diagram may be modified at any time with the development of new technology.

Notes:
1. S201: Off Center Switch.
2. S202: Guard Zone Alarm Switch.
3. S203: Display Brilliance Control Switch.
4. S204: Target Expansion/Navigation Data Display Switch.
5. S205: Function Switch.
6. S206: Range (Up) Switch.
7. S207: VRM Shift ON/OFF Switch.
8. S208: Fixed Range Ring Display Switch.
9. S209: Anti Clutter Rain Switch.
10. S210: Memory Display Switch.
11. S211: Heading Marker OFF Switch.
12. S212: Range (Down) Switch.
13. S213: Transmit/Standby Switch.
14. S214: EBL/VRM Position Switch.
15. S215: VRM1/VRM2 ON/OFF Switch.
16. S216: EBL/VRM Position Switch.
17. S217: EBL1/EBL2 ON/OFF Switch.
18. S218: Power ON/OFF Switch.

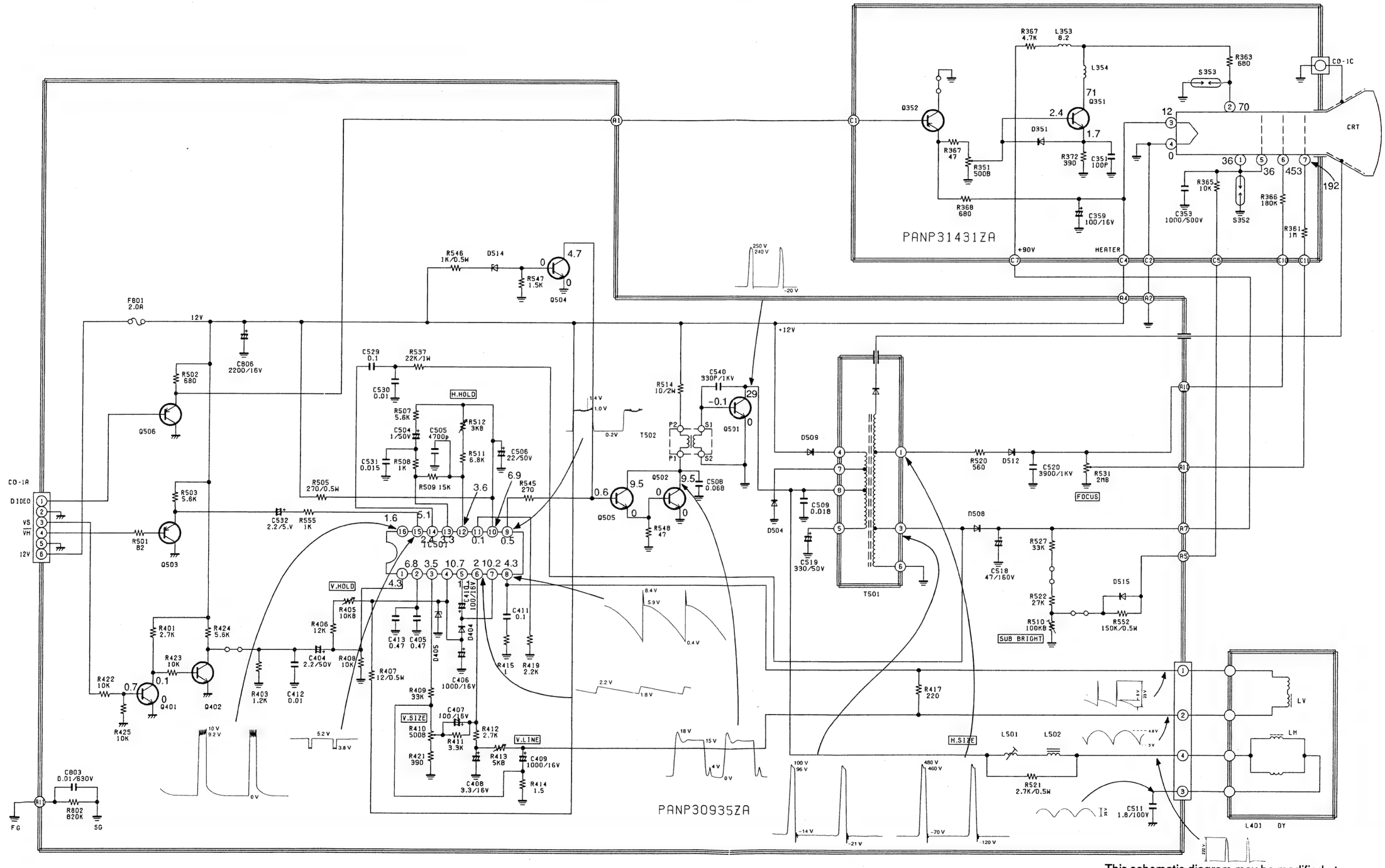
SCHEMATIC DIAGRAM (PQUP1097ZA)
Power Supply P.C. Board



This schematic diagram may be modified at any time with the development of new technology.

SCHEMATIC DIAGRAM (PANP30935ZA or PQUP828ZA)

Display Unit P.C. Board

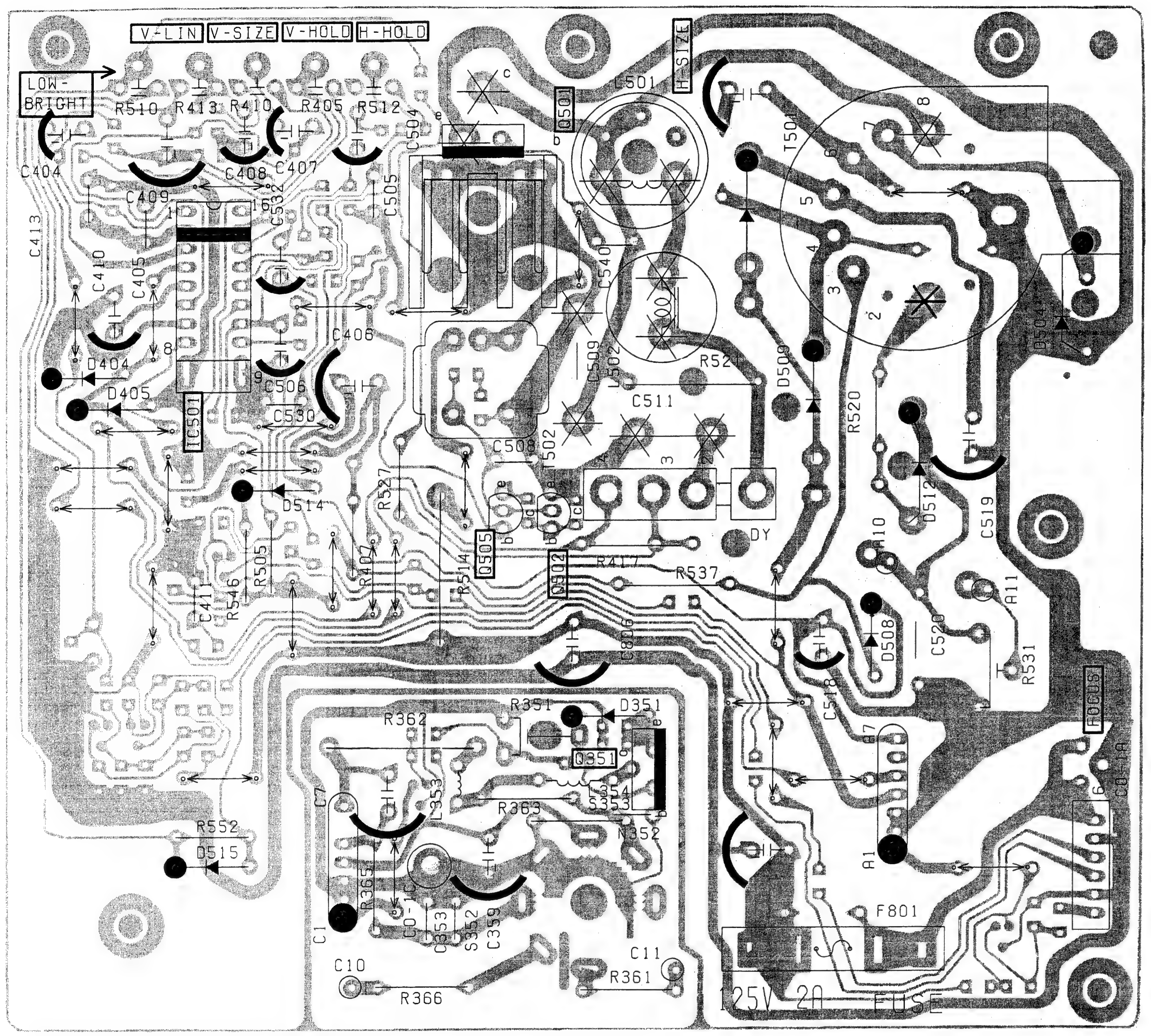


This schematic diagram may be modified at any time with the development of new technology.

CIRCUIT BOARD (PANP30935ZA or PQUP828ZA)

Display Unit

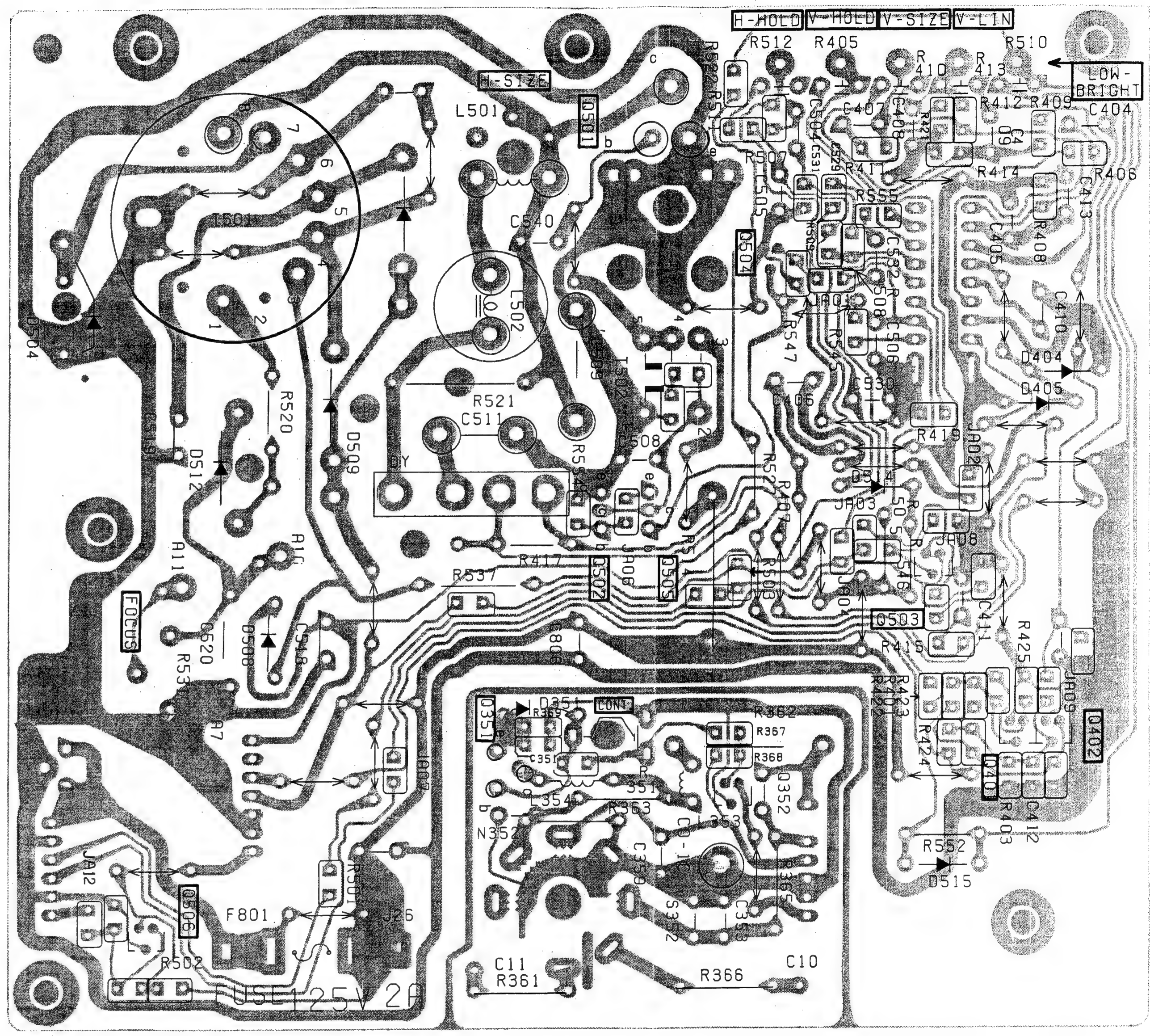
(Component View)



CIRCUIT BOARD (PANP30935ZA or PQUP828ZA)

Display Unit

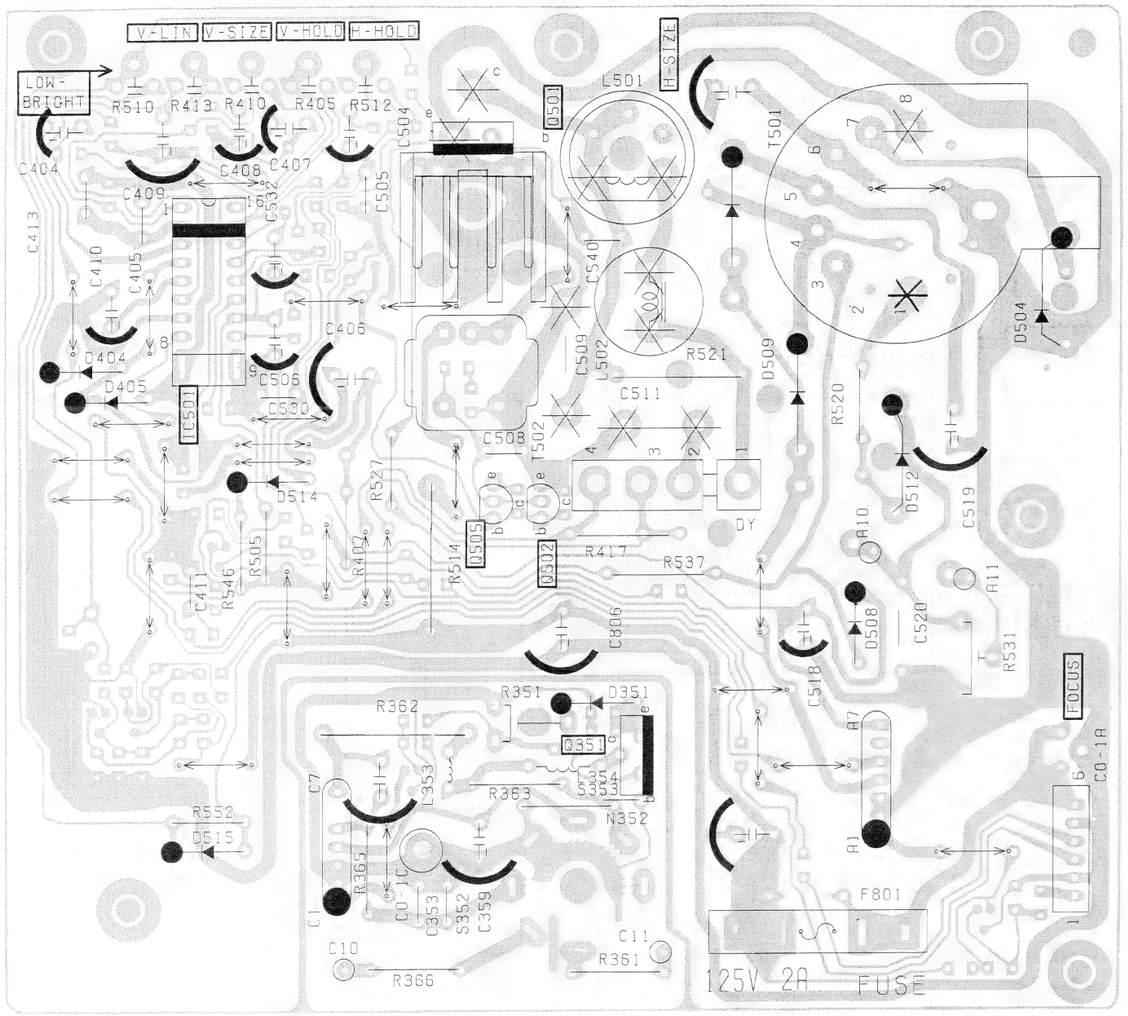
(Flow Solder Side View)



CIRCUIT BOARD (PANP30935ZA or PQUP828ZA)

Display Unit

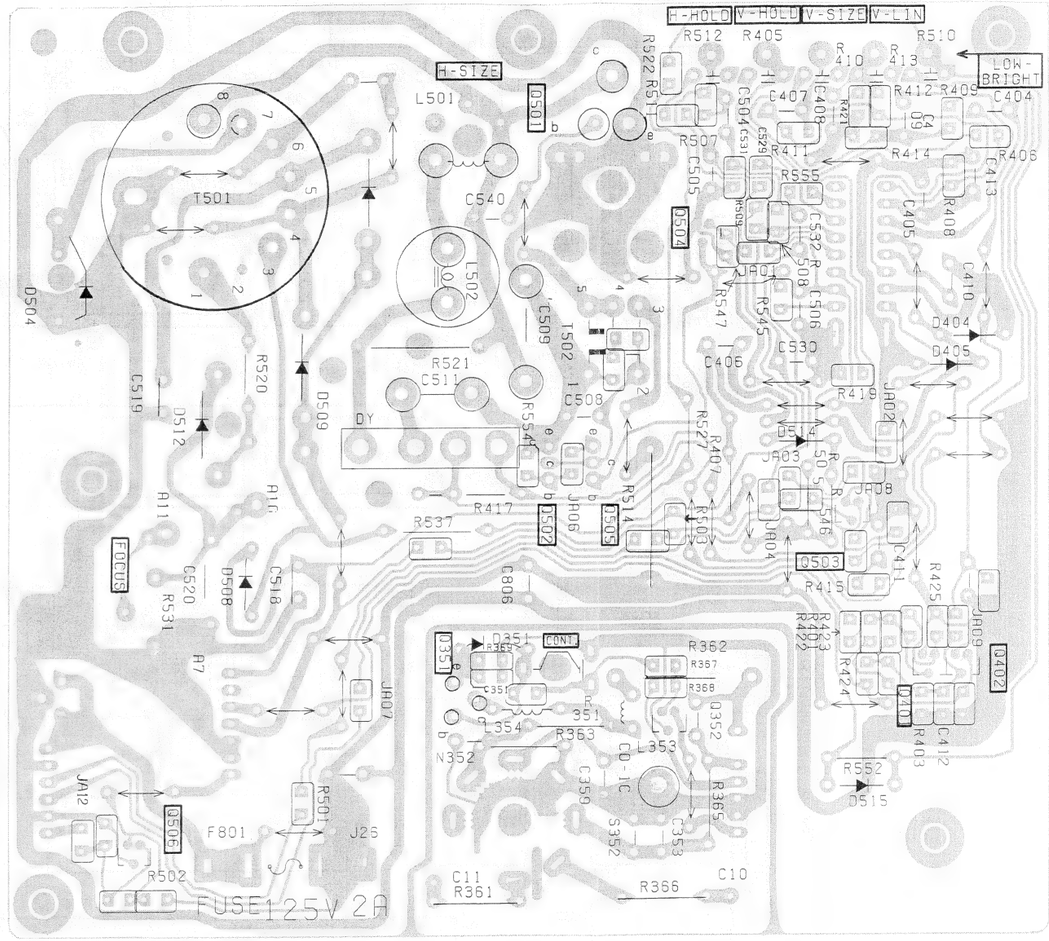
(Component View)



CIRCUIT BOARD (PANP30935ZA or PQUP828ZA)

Display Unit

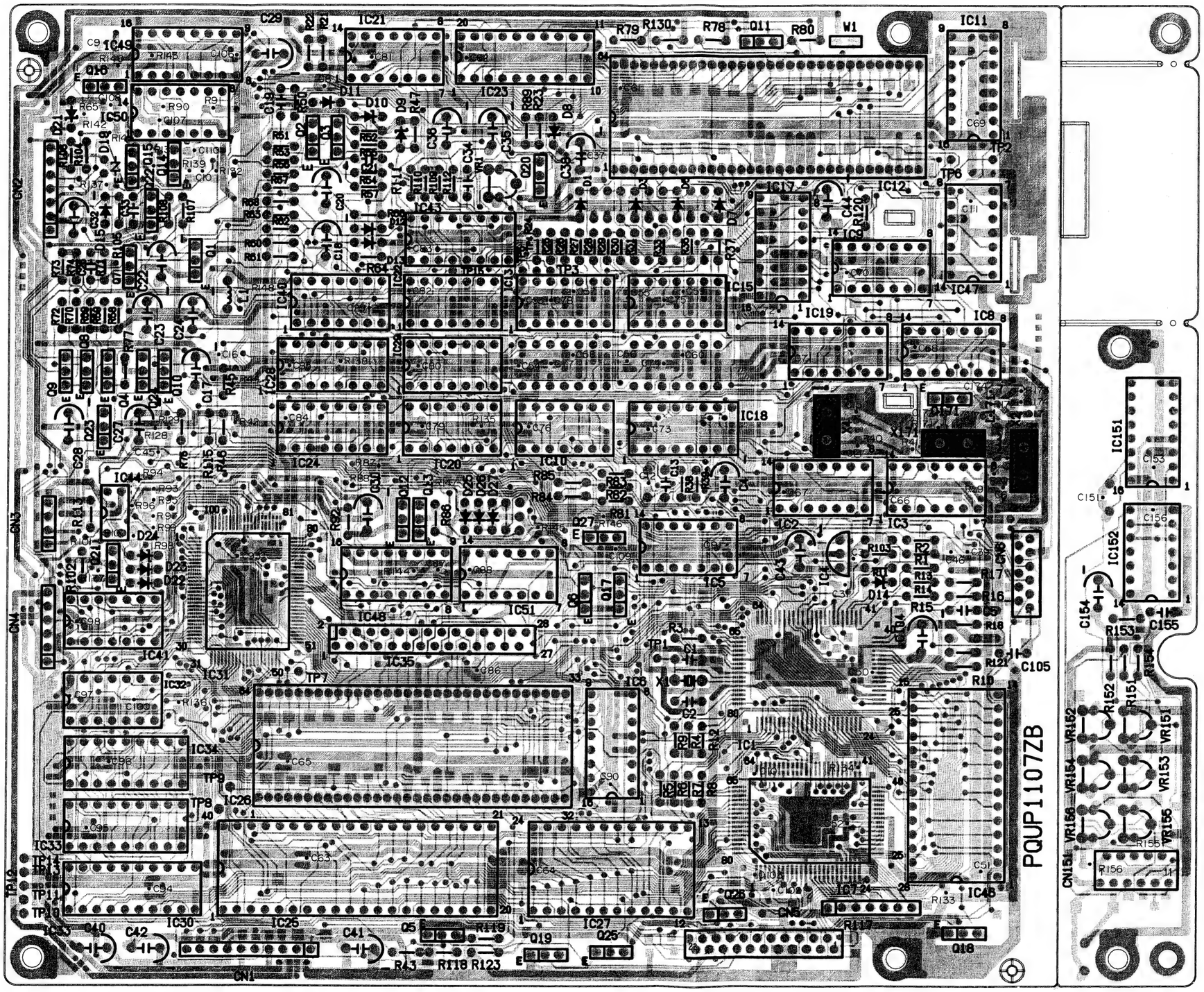
(Flow Solder Side View)



CIRCUIT BOARD (PQUP1107ZA)

Signal Processor P.C. Board

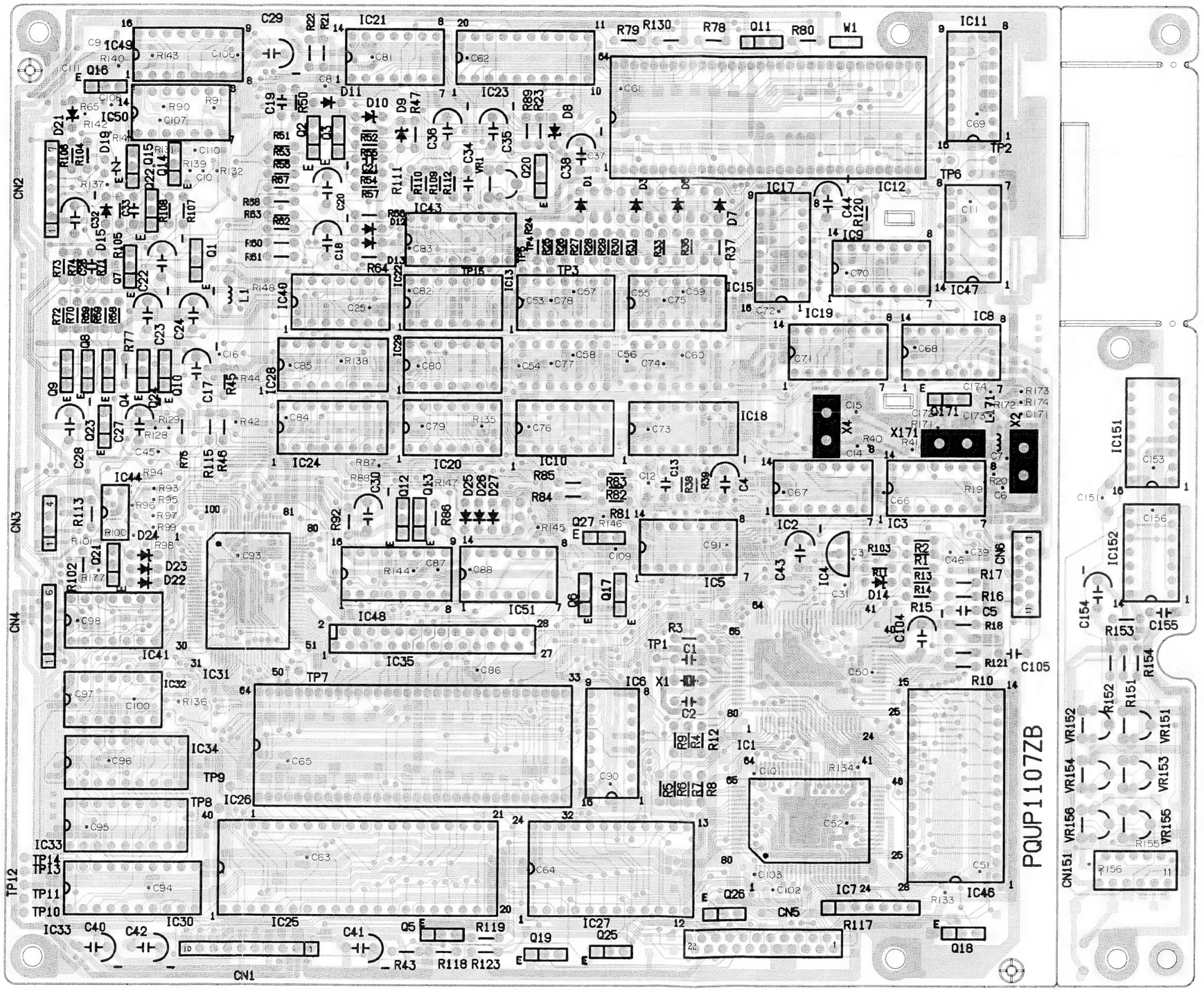
(Component View)



CIRCUIT BOARD (PQUP1107ZA)

Signal Processor P.C. Board

(Component View)



CIRCUIT OPERATIONS

1. BLOCK DESCRIPTION

Given below is a rough block diagram.
When the power ON key on the display unit is pressed, the preheating operation of the magnetron is completed after 1 min 30 sec, and the radar is placed in the standby mode. When the TX/STBY key on the display unit is pressed, TX trigger pulses are generated from the signal processor board inside the display unit, and these are sent to the transmitter in the scanner unit.
In the transmitter, 9410 MHz microwave pulse signals are generated in synchronization with the trigger pulses, and these are radiated from the antenna into space.
The reflected echo signal from the target is received by the same antenna and amplified in the receiver.
The detected signal from the receiver is sent to the display unit where it is A/D converted and stored in the memory on the processor board. The write address of the memory is determined by the distance information (time elapsed from generation of transmission pulses) and antenna bearing data.
The video data read from the memory assigned by the horizontal/vertical address data of the processor board is sent to the CRT display circuit, and it is indicated at the required CRT position in synchronization with the horizontal/vertical signals from the processor board.
The characters, markers, EBL, VRM and other data are also displayed on the CRT in a similar way as the video signals.

Brief Block Diagram

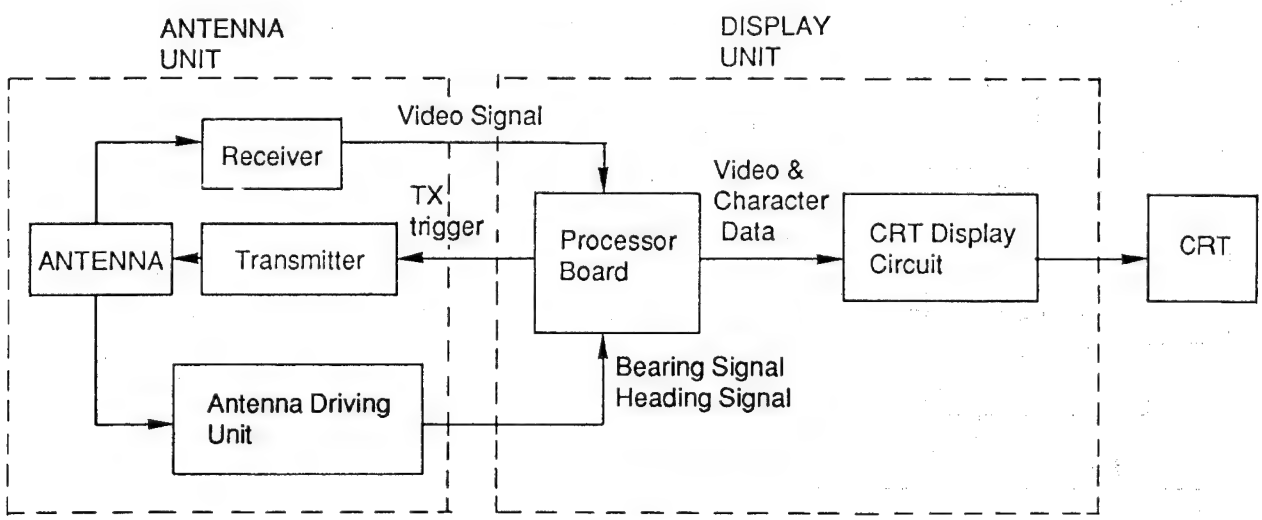


Fig. 32

2. CIRCUIT DESCRIPTION

2-1 Display Unit

Refer to the block diagram on the next page.
2-1-1 Processor board (PQUP1107ZA)
This board is composed of the 6 major blocks listed below.

1) **Video Signal Processor / Character / Mark Generator**
2) **PLL Circuit**
3) **TX Trigger Generator**
4) **Clock Generator**
5) **Horizontal / Vertical Sync Pulse Generator**
6) **Alarm Circuit**

1) Video Signal Processor / Character / Mark Generator

Circuit Operation:

The video signals from the antenna unit are supplied to the ACR (anti-clutter rain) circuit in order to reduce clutter from rain or snow. Only when the A.C. RAIN key on the display unit is pressed, the selector circuit is activated, and the video signals pass through the ACR circuit. After passing through the RC differentiation circuit in the ACR circuit, the video signals are sent to the EXP (echo expansion) circuit.
When the FUNC + EXP keys on the display unit are pressed, the video signals are switched to pass through the EXP circuit by the selector circuit. In the EXP circuit, the pulses of the video signals are expanded, and the signals are sent to the A/D converter circuit, they are ranked as to their amplitude, they pass through the gate array circuit, and are stored in the primary SRAM (static RAM).
The video data stored in the SRAM is moved into the DRAM (dynamic RAM). The DRAM address is assigned by the address gate array. The echo data of the assigned address written in the DRAM is parallel-serial converted by the serializer circuit in the gate array, and the data then passes through the D/A converter and is sent to the CRT module.
The character and mark data are generated by the GDC (Graphic Display Controler) and stored in the character DRAM. The DRAM character/mark data is converted into serial data, as with the echo data, combined with the echo data and then sent to the CRT module via the D/A converter circuit.

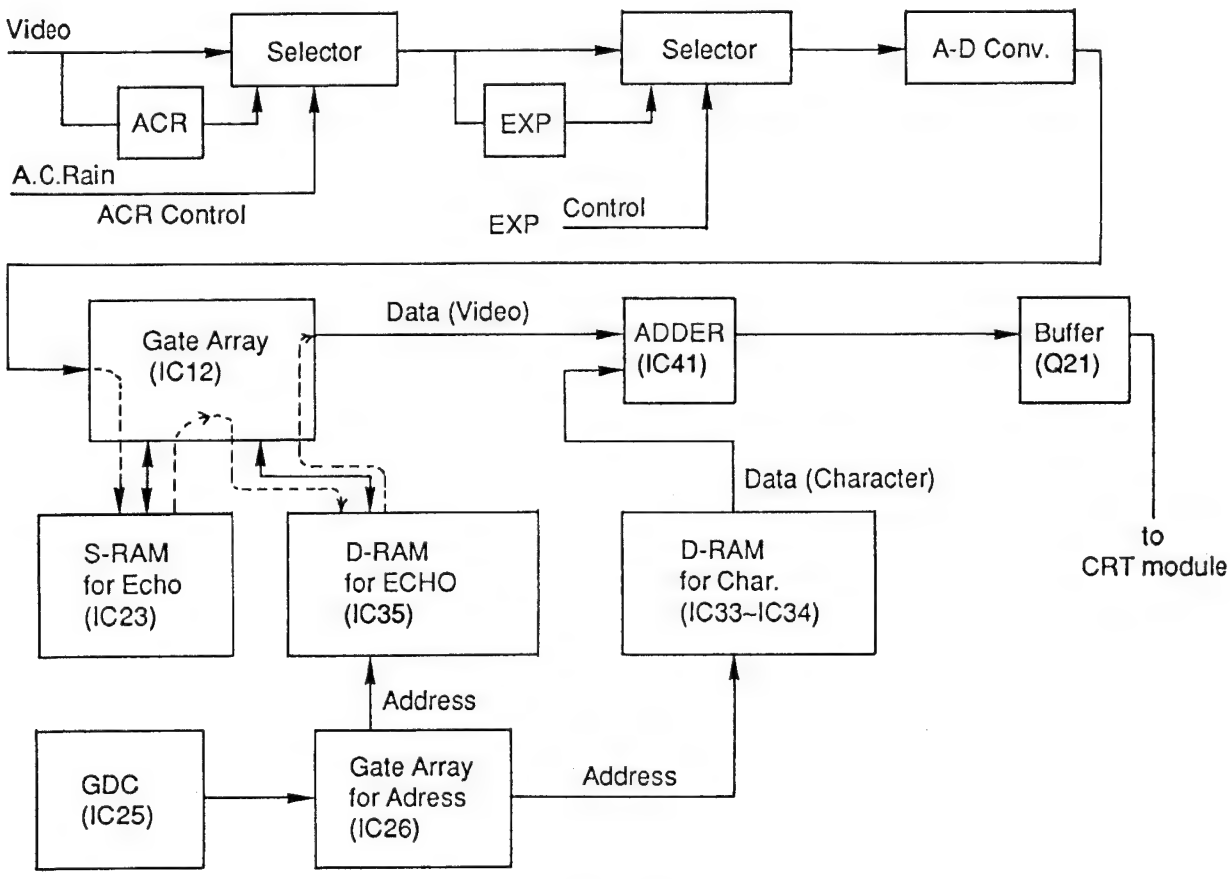


Fig. 33

2) PLL Circuit

Circuit Operation:

The bearing signal is multiplied from 360 pulses/rotation to 4096 pulses/rotation in the PLL circuit and sent to the CPU. The heading pulses are sent to the CPU via the shaping circuit. These pulse signals are used in the processing for the azimuth information.

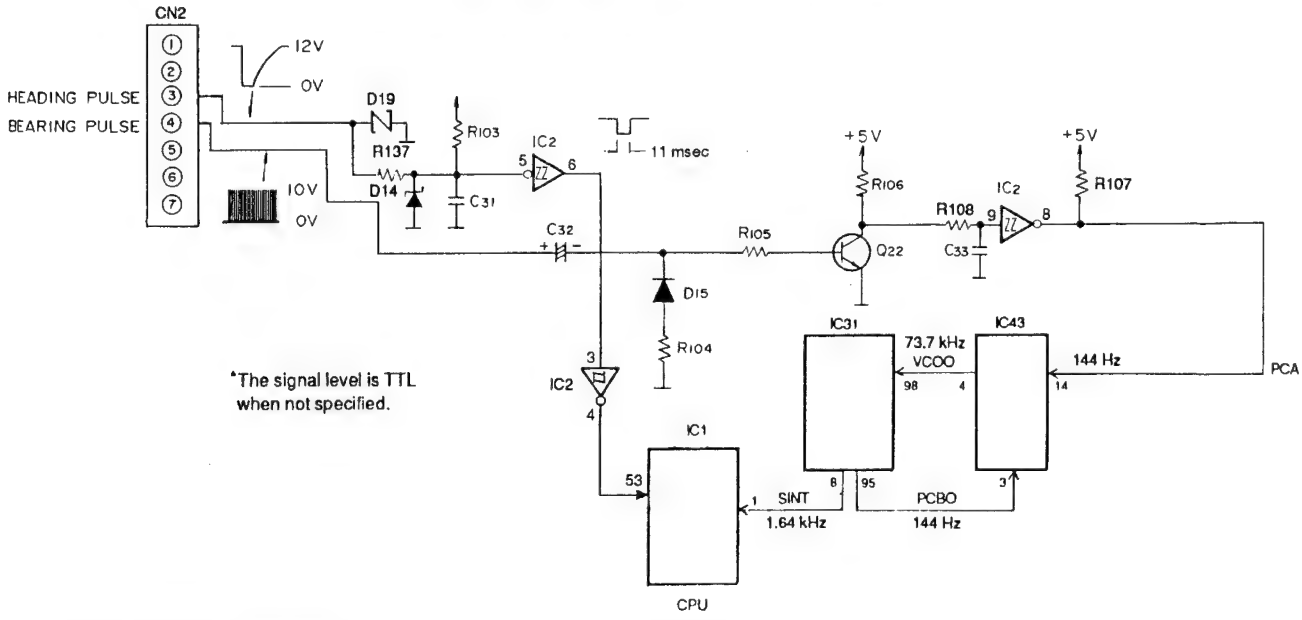


Fig. 34

3) TX Trigger Generator

Circuit Operation:

When the TX key on the display unit is pressed, TX trigger pulses are generated by the CPU, and these are sent to the antenna unit via the synchronizing circuit, gate circuit and buffer circuit (Q7 ~ Q9).

The TX trigger signal path is as follows;

IC1 pin26 → IC18 pin2 → IC18 pin13 → IC19 pin2 → IC19 pin5 → IC22 pin11 → IC22 pin8 → IC20 → Q1 → Q7 → Q8, Q9 → CN2 pin1 → Antenna Unit

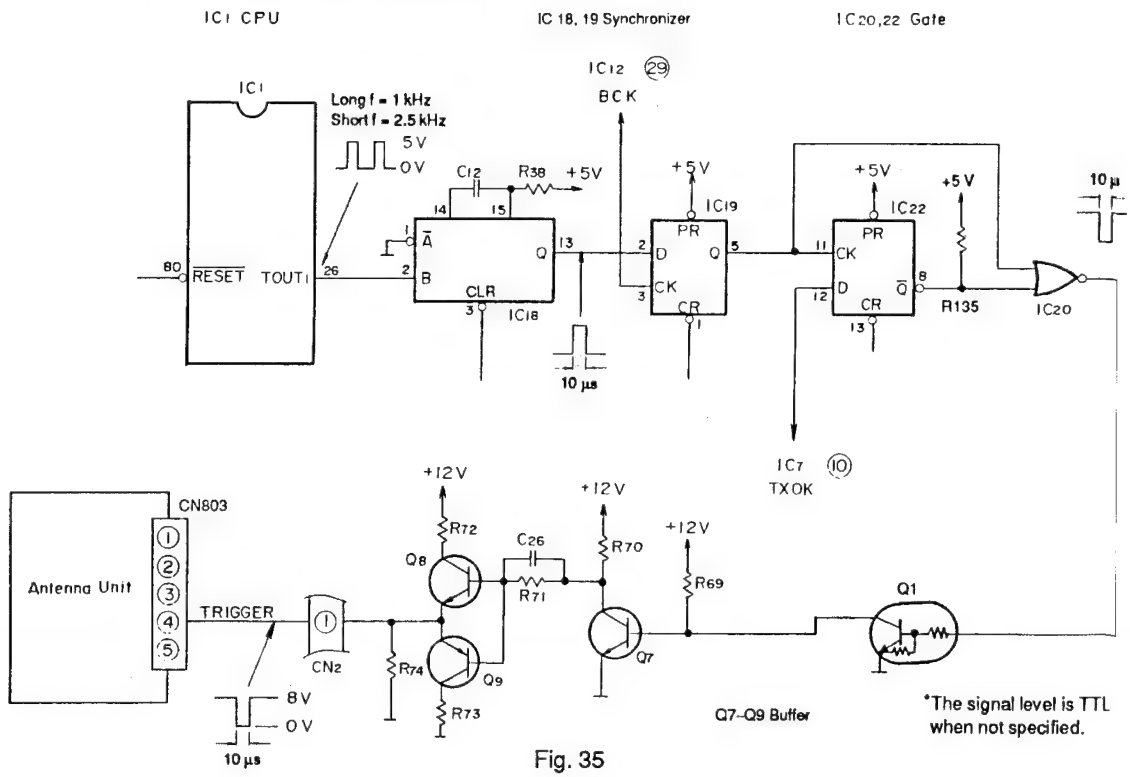


Fig. 35

4) Clock Generator

Circuit Operation:

The display unit has four reference clock generators. The 12.2 MHz is used for the CPU clock, the 21.0525 MHz generator for the time base for the SRAM, and the 62.16 MHz generator for the timing pulse for echo sampling, and 16.625 MHz generator for the display time base.

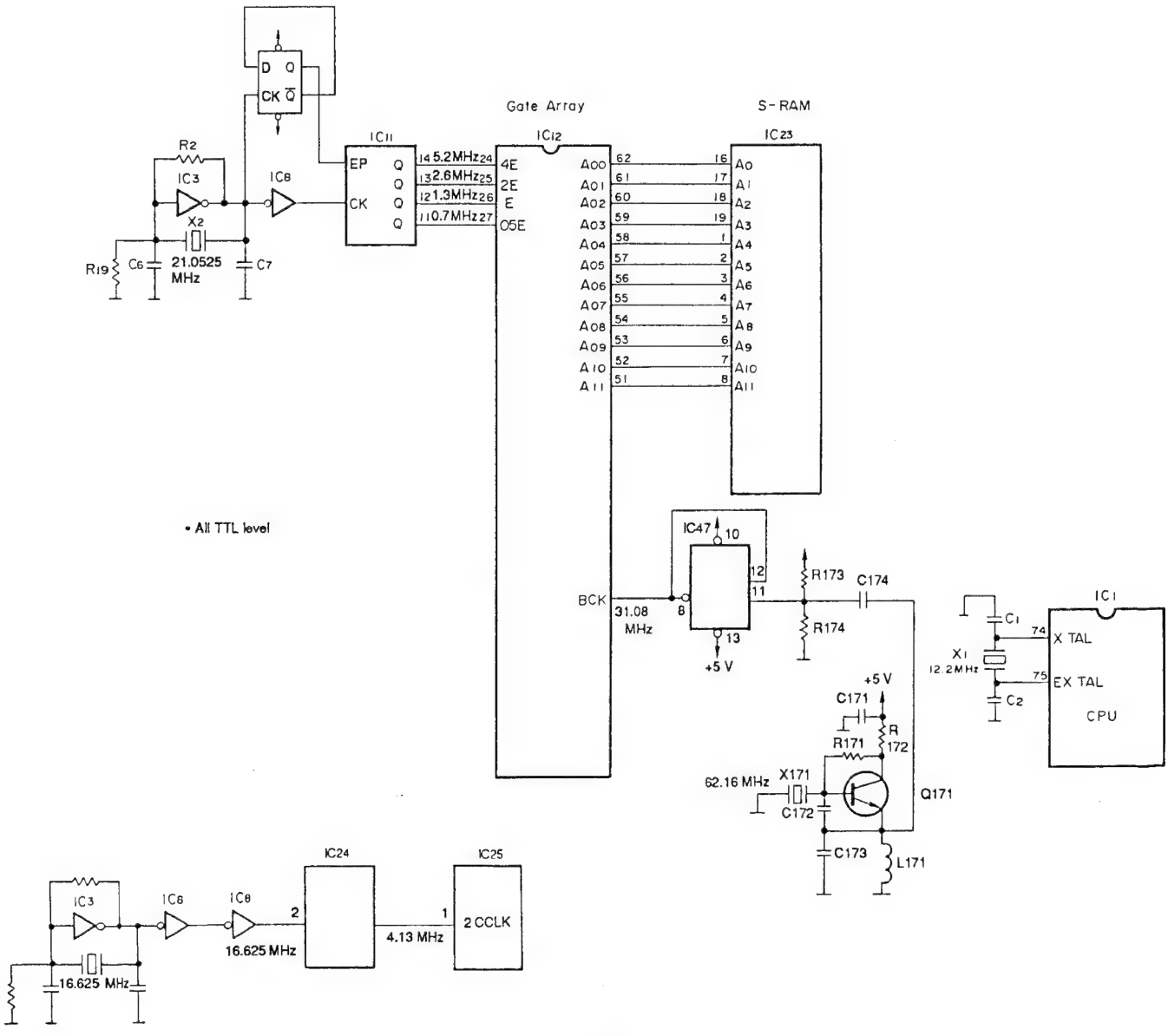


Fig. 36

5) Horizontal / Vertical Sync Pulse Generator

Circuit Operation:
The horizontal and vertical sync pulses are generated by the GDC and supplied to the CRT circuit.

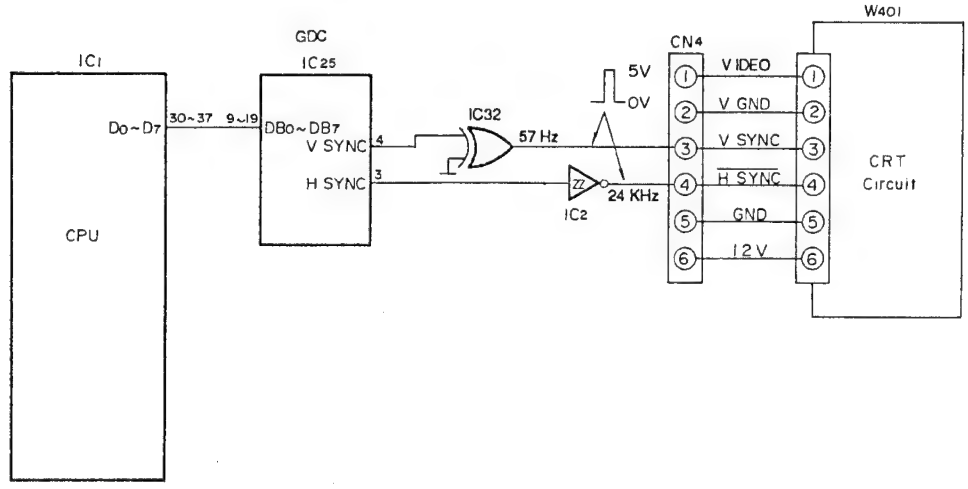


Fig. 37

6) Alarm Circuit

Circuit Operation:
The alarm zone corresponding to the alarm zone setting is set in the programmable counter. The signal indicating the alarm bearing zone is supplied from the CPU to the gate circuit.
When echo signals exist in the selected area, the output signal from the gate circuit (IC20, IC3) triggers the one-shot circuit, and a pulse of approx. 0.5 sec is generated. The 2 kHz audible clock signal is gated in the gate circuit, and it drives the buzzer in the display unit. The amplifier consisting of Q4 (Q23, Q24) serves to amplify the alarm signal supplied from the gate circuit and drive the optional externally connected speaker.

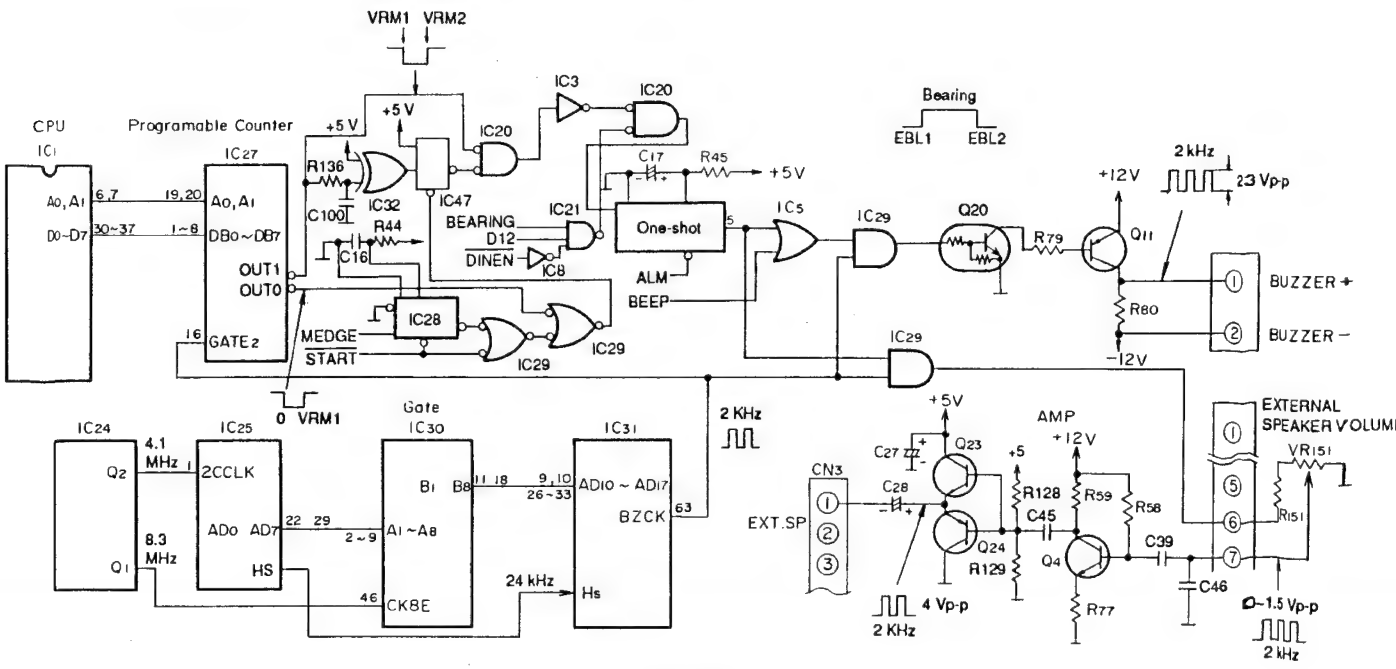


Fig. 38

2-1-2 CRT Display Circuit

Circuit Operation:
This circuit is composed as shown below in the circuit diagram. A general description of their functions and operations is given below.

1) Video amplifier: This amplifies the video signals sent from the signal processor to a level (approx. 40 V) which can drive the CRT tube.
2) Vertical oscillator output circuit: This allows a sawtooth wave current corresponding to the vertical sync signal to pass to the deflection yoke.
3) Horizontal oscillator output circuit: This allows a sawtooth wave current corresponding to the horizontal sync signal to pass to the deflection yoke.
   High-voltage generator circuit: This generates the high voltages required for CRT operation.

1) Video Amplifier

Circuit Operation:
The video signals sent from the signal processor have their voltage amplified to approximately 40V by the Q352 and Q351 cascade amplifier, after which the signals are supplied to the CRT cathode via R363 configure a circuit which protects the CRT center from shining and the phosphor from burning when the power is off.

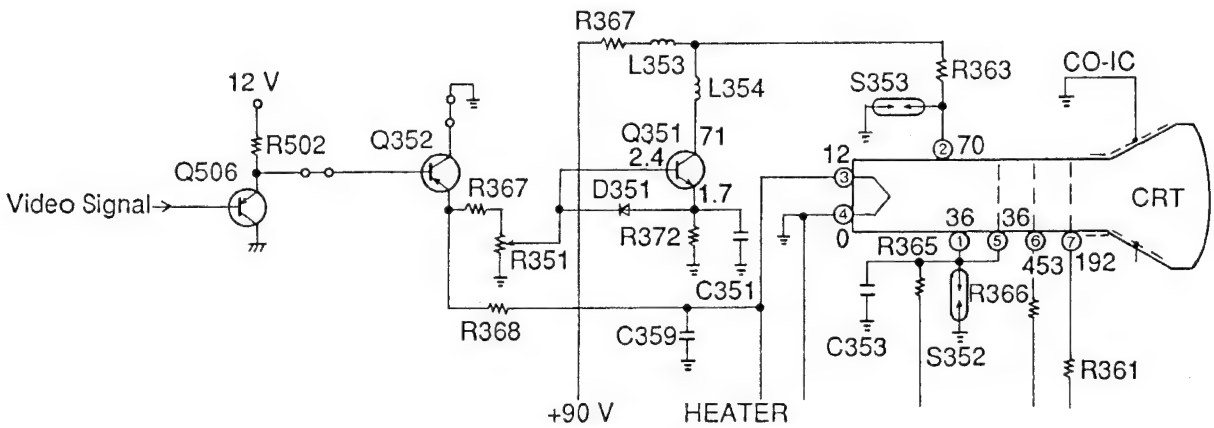


Fig. 39

2) Vertical Oscillator Output Circuit

Circuit Operation:
The vertical sync signal output from the signal processor is supplied to pin1 of IC501 via the low-pass filter consisting of R404 and C402. In the vertical oscillator circuit, sawtooth waveforms are generated as the charging voltage waveforms of C405, and these are sent to the vertical output circuit. The frequency of the oscillator circuit is determined by the bias voltage (pin1) adjusted by R405 and, if this value is within the determined range, it is locked by the V-SYNC signal.
The signal which is the output of the vertical oscillator circuit has its power amplified by the vertical output circuit, and it is output from pin 8. The current path is DY → C409 → R410, and R413 in the feedback path to pin 6 is a potentiometer for adjusting the linearity while R410 is for adjusting the deflection size. The feedback supplied to pin 3 via R409 is designed to stabilize the oscillator frequency.

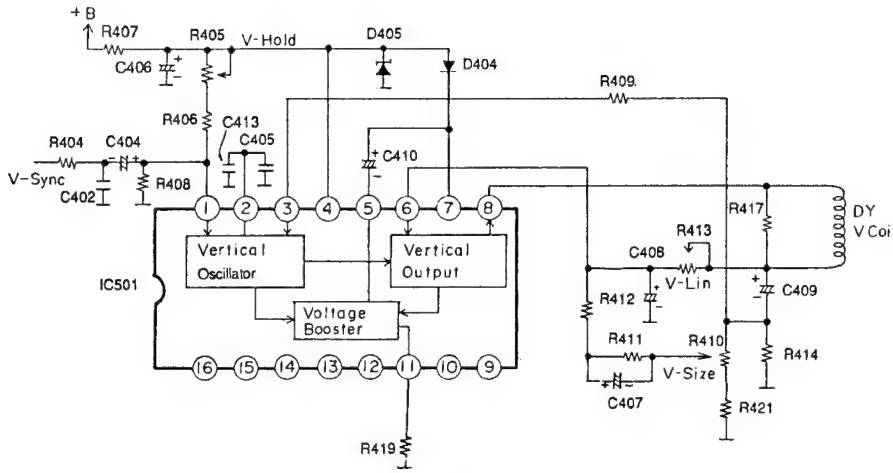


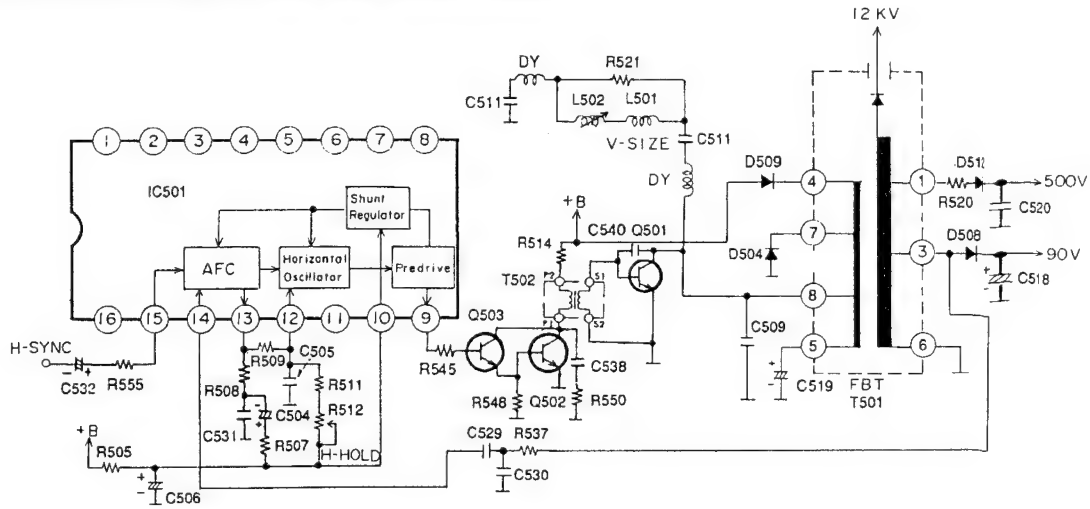
Fig. 40

3) Horizontal Oscillator Output Circuit/High-Voltage Generator Circuit

Circuit Operation:

After it is output from the signal processor, the horizontal sync signal (H-SYNC) is supplied to pin 15 of IC501 via C532 and R558. The oscillator frequency of the horizontal oscillator circuit is stabilized by the H-SYNC signal and feedback signal (pin 14) from the flyback transformer (FBT), and after it has been amplified by the predrive circuit, it is output from pin 9. This signal has its polarity reversed by Q503, and it is sent to switching transistor Q501 via Q502 and T502 buffer. The Q501 collector resonates with C509 and the FBT inductance components, and it generates pulses with a voltage of approximately 250V. Due to these pulses, a sawtooth current flows to the deflection coil, and a horizontal deflection magnetic field is generated.

The Q501 collector signal is sent to the FBT (flyback transformer) and it generates the 90V, 500V and 12kV voltages. The 90V line is used as the power supply for generating the signals which are supplied to the cathode, and the voltage is divided down by R452, R453 and R544 and sent to the first grid of the CRT. The 500V line is supplied to the second grid and further divided down by R520 and R531, after which it is supplied to the third grid as the focus control voltage.



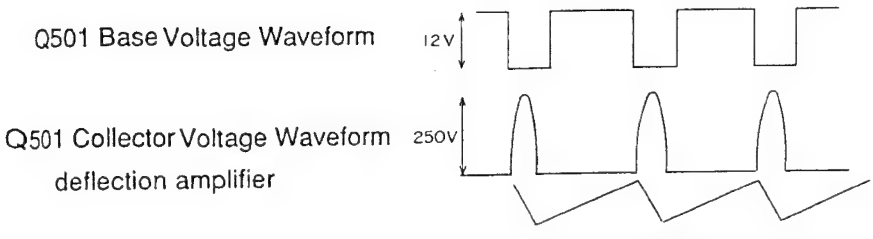


Fig. 41

2-1-3 Power Supply

Circuit Operation:

The inverter circuit consists of the switching regulator control circuit, power amplifier, switching circuit and output monitor circuit.

When the power key on the display unit is pressed, the power control circuit is activated and power is supplied to the switching regulator circuit. The switching regulator control circuit generates a pulse train with a frequency of approximately 90 kHz, and the pulse width is changed by the feedback signal from the output monitor circuit. The output pulse train from the switching regulator control circuit is amplified by the power amplifier, supplied to the switching circuit and used to control the switching of the power input to the transformer.

The power output of the transformer is rectified by the rectifier circuit, and the required DC voltages are obtained. When the DC output voltage has increased, the pulse width of the pulse train output from the switching regulator control circuit is reduced by the feedback signal from the output monitor circuit, and the DC output is reduced. This is how the DC voltage is kept constant.

When an overload occurs in the antenna unit, a protect signal is supplied from this unit to the protect control circuit to stop the operation of the switching regulator circuit, and shut down the power supply.

When the FUNC + SAVE keys on the display unit are pressed, the display power control signal from the CPU is cut off, and the 12 V power for the CRT circuit is cut off via the SAVING CONT circuit to reduce the power consumed in the standby mode.

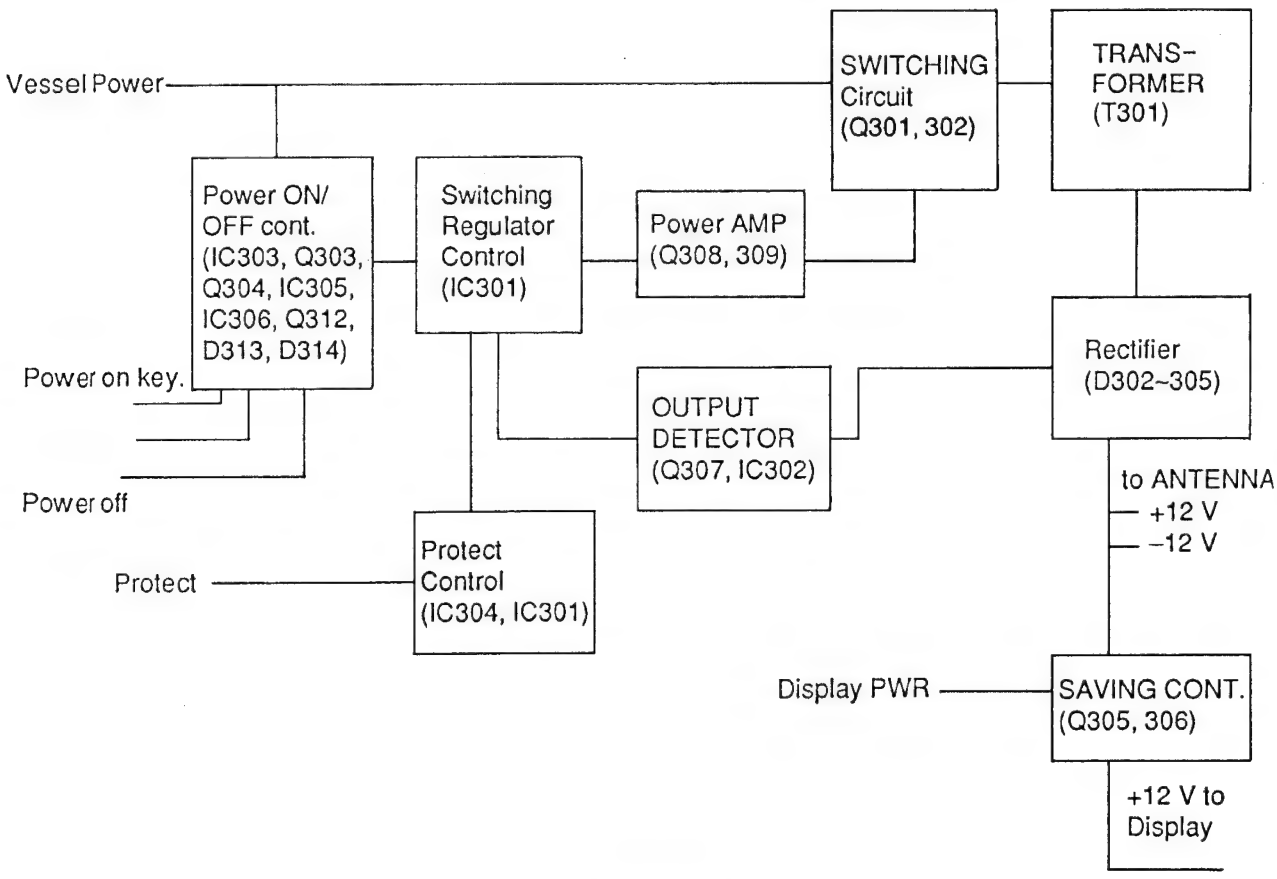


Fig. 42

2-2. Antenna unit

Circuit Operation:
Transmitter/Receiver P.C. Board (PQUP1005ZA)
This P.C. Board consists of the modulator circuit, pulse width control DC-DC converter, IF amplifier.

1) Pulse width Control

Circuit Operation:
When the trigger signal from the display unit is received, IC801 outputs the base signal for the pulse width from pin 4.
The pulse width is changed by Q812. The pulse width of long pulses is determined by the time constant of C802 and R805. In the case of short pulses, Q812 becomes ON, R836 is connected in parallel with R805, and the pulse width become narrower.

2) Modulator Circuit

Circuit Operation:
The base signal sent from the pulse width control circuit is amplified by Q803, Q804 and Q805 to the level necessary to drive FET Q806. Q806 switches +300 V from the rectification circuit which is then applied to T801. T801 steps up 300 V to 2 kV high voltage pulses and applies them to the magnetron.
By adjusting VR801, the gate voltage of Q806 will change, causing the rising speed of Q806 to change. In this way fine adjustment of the transmission pulse width can be performed.
The pulse current that flows into the magnetron is rectified by D804 and D805, and smoothed by C808 and R816. By measuring the resulting voltage, the current flowing through the magnetron can be checked.

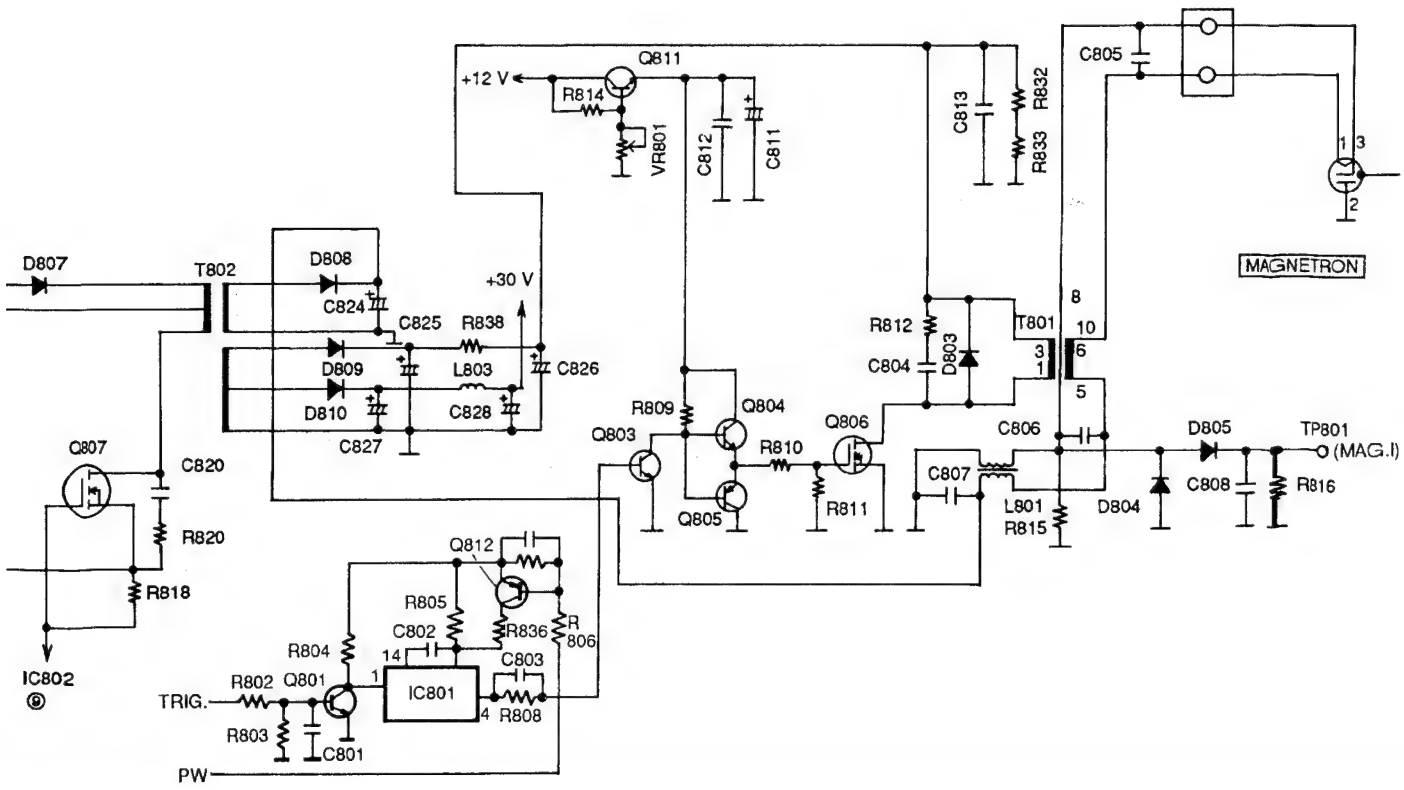


Fig. 43

3) DC-DC Converter

Circuit Operation:

This circuit generates the DC high voltages (300V) for the modulator and the DC power supply for the hearter of magnetron. It consists of the switching regulator control IC circuit (IC802), switching circuit (Q807), transformer (T802), and rectifier circuit (D808~D810).

The regulated +12V/-12V DC supply voltages are supplied to the primary winding of the transformer (T802) via the filter choke (L804) and switching FET (Q807).

The switching regulator IC (IC802) generates the pulse train with a frequency of approximately 45 kHz and a duty ratio of 45%, it drives the switching FET gate, and performs FET switching.

The pulse current flowing through the transformer primary winding is transfered to its secondary, it is rectified by the rectifier circuit, and both the 300V power supply for the modulator and the power supply for the magnetron heater are provided.

The DC power for the magnetron heater passes through the choke coil (L801) and secondary windings of the pulse transformer (T801), and is used to heat up the magnetron heater.

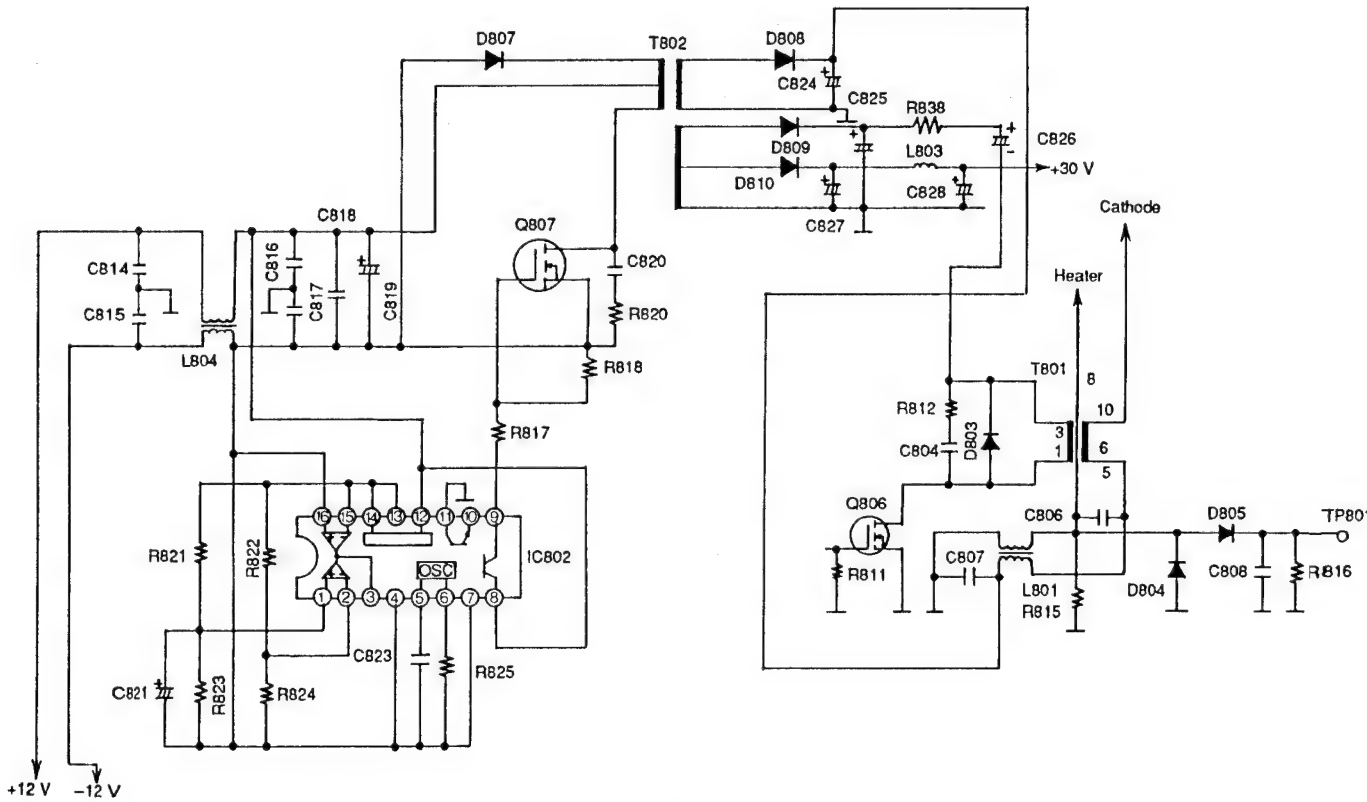


Fig. 44

4) Duplexer and Mixer

Circuit Operation:
A circulator is used to switch the transmit and receive signals of the radar.
The RF output from the magnetron is supplied to the circulator. The power supplied to the input port 2 of the circulator is fed to the antenna side port 3 of the circulator, it is passed to the antenna via the rotary joint, and is radiated into space.
The RF echo signals received by the antenna are supplied to port 3 of the circulator via the rotary joint. These signals are fed to port 1 of the circulator and then to the microwave integrated circuit (MIC).
The MIC is a superheterodyne type receiver consisting of a limiter, mixer and local oscillator. The RF signals supplied via the circulator are supplied to the mixer stage via the limiter. The limiter serves to protect the receiver from excessive input signals supplied from the antenna. When excessively high input signals are supplied, they are reflected by the limiter.
The mixer serves to mix the 9410 MHz received signal with the local oscillator signal contained in the MIC, and it converts the resulting signal into a 60 MHz IF signal. This 60 MHz IF signal is sent to the IF amplifier.
The frequency of the local oscillator is controlled by the tuning control voltage so that an optimum IF frequency signal is obtained by manually adjusting the tuning knob on the display unit.

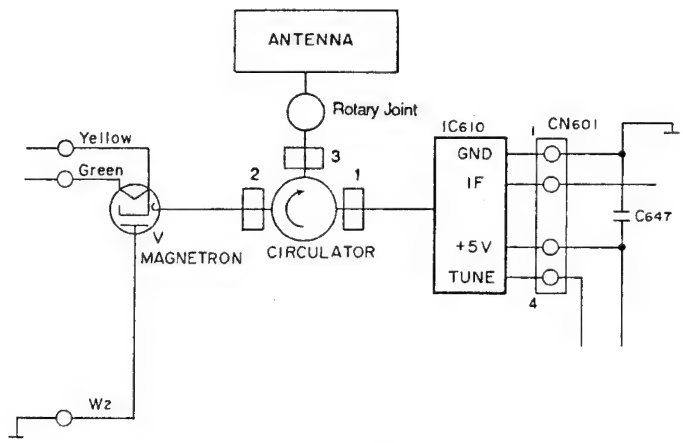


Fig. 45

5) IF Amplifier (PQUP1005ZA)

Circuit Operation:
The amplifier board consists of an IF amplifier (Q601, IC601), bandwidth selector circuit (Q603,Q604,Q612), post IF amplifier, detector, STC circuit (A.C.Sea clutter), tuning indicator circuit and tuning control circuit.

IF Amplifier Circuit

The received IF signal from the MIC (microwave integrated circuit) is amplified by about 20 dB by transistor amplifier section (Q601) of the IF amplifier circuit, and is sent to IF amplifier IC601 via IFT (T601). It is amplified by about 35 dB by IC601 and sent to the bandwidth selector circuit in the next stage via IFT (T602).

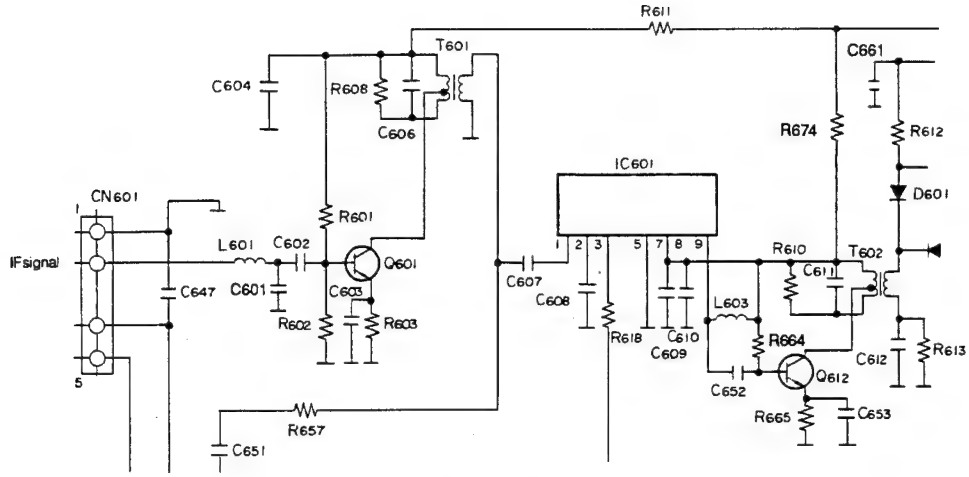


Fig. 46

Bandwidth Selector Circuit and Post IF Amplifier

The IF bandwidth of the IF amplifier is switched between approximately 8 MHz and 3 MHz, depending on whether the long or short pulse mode has been selected. In short pulse mode, the output signal from IF amplifier IC601 is connected to the next stage post IF amplifier via IFT (T602) and diode D602. The bandwidth on short pulse mode is set to approximately 8 MHz.
In the long pulse mode, transistor Q604 is driven into conduction by the PW signal from the display unit, the bandpass filter consisting of Q603 and T603 is overridden, and the bandwidth of the IF amplifier is set to 3 MHz.
The bandwidth selector circuit output is sent to the next stage post amplifier section (IC602) where it is amplified by about 35 dB, after which it is supplied to the detector circuit.

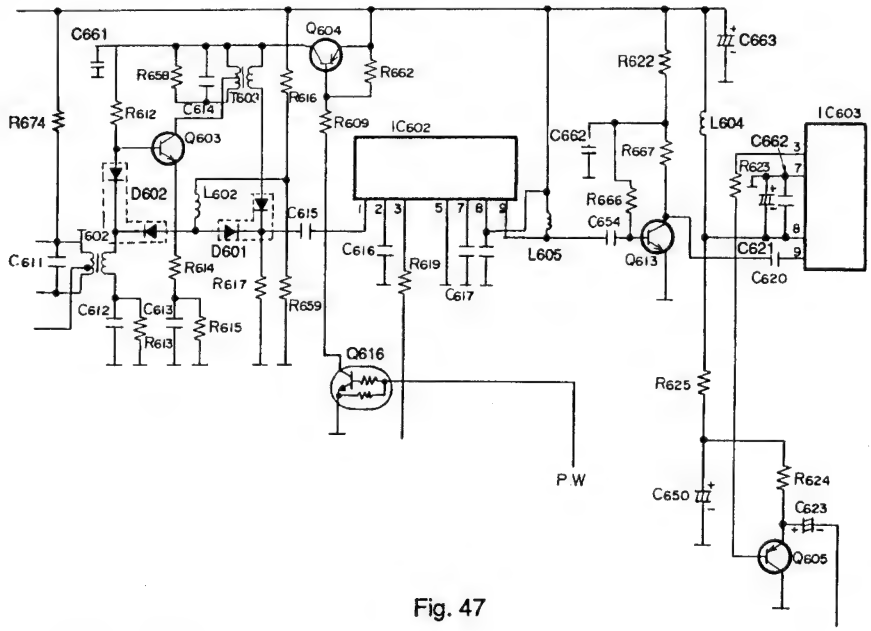


Fig. 47

Detector Circuit (IC603, Q605)

The IF signal output from the post amplifier is supplied to IC603 where it is amplified by about 10 dB, it is detected by the detector circuit inside IC603 and converted into a video signal. The IC603 video output is sent to the display unit via buffer circuit Q605.

Local Ocillator Tuning Control Circuit (IC604, Q611)

The frequency of the local oscillator contained in MIC is adjusted using the tuning knob on the display unit. The voltages of the tuning signals (fine tune, coarse tune) from the display unit are converted by an adder circuit IC604 and transistor Q611, and a DC output of between about 3V and 22V is obtained. The tuning control voltage is supplied to the tuning pin of the MIC and it is used to control the oscillator frequency of the local oscillator in the MIC.

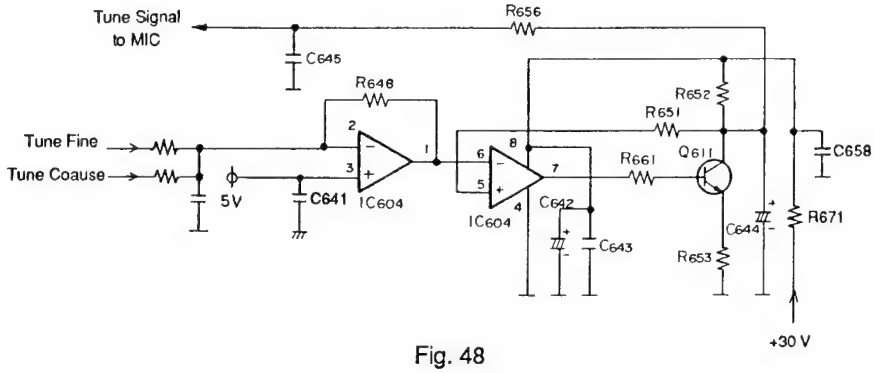


Fig. 48

Tuning Indicator Circuit

Part of the IF preamplifier output is sent to narrow band amplifier Q606 via T601. Q606's collector circuit is connected to a 60 MHz tuned circuit (C626, T605). The IF signal from the tuned circuit are detected by the diode detector circuit (D605, 606) and sent via Q607 to the display unit as the tuning indication signal. When the IF signals have a frequency of 60 MHz, the output level of the tuning indicator reaches its peak (approx. 2 VDC); when the frequency has shifted by about 2 MHz, the output voltage decreases to half level. In the display unit, the tuning condition is indicated on the display on the basis of this voltage.

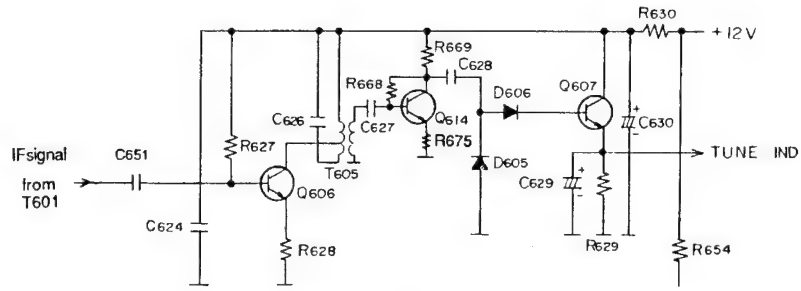


Fig. 49

6) Signal MPX Circuit

Circuit Operation:

The control signals TUNE FINE, TUNE COARSE, GAIN, ACS, PW, and TUNE IND from the display unit are converted in synchronism with the bearing signals from the antenna unit (approx. 144 Hz), and sent in multiplexed form as one data signal.

The various control signals are extracted from this data signal by the analog switch, IC805, sample-held in IC808 and IC809, and output.

The output from IC805 is converted by bit 3 of the output from IC806, and the heading signal from the heading sensor is passed through buffer Q824, synchronized with the bearing signal in IC807, and used to reset the counter.

The heading signal is output to buffer Q822, and the bearing signal passes through buffer Q823 and is output at the display section.

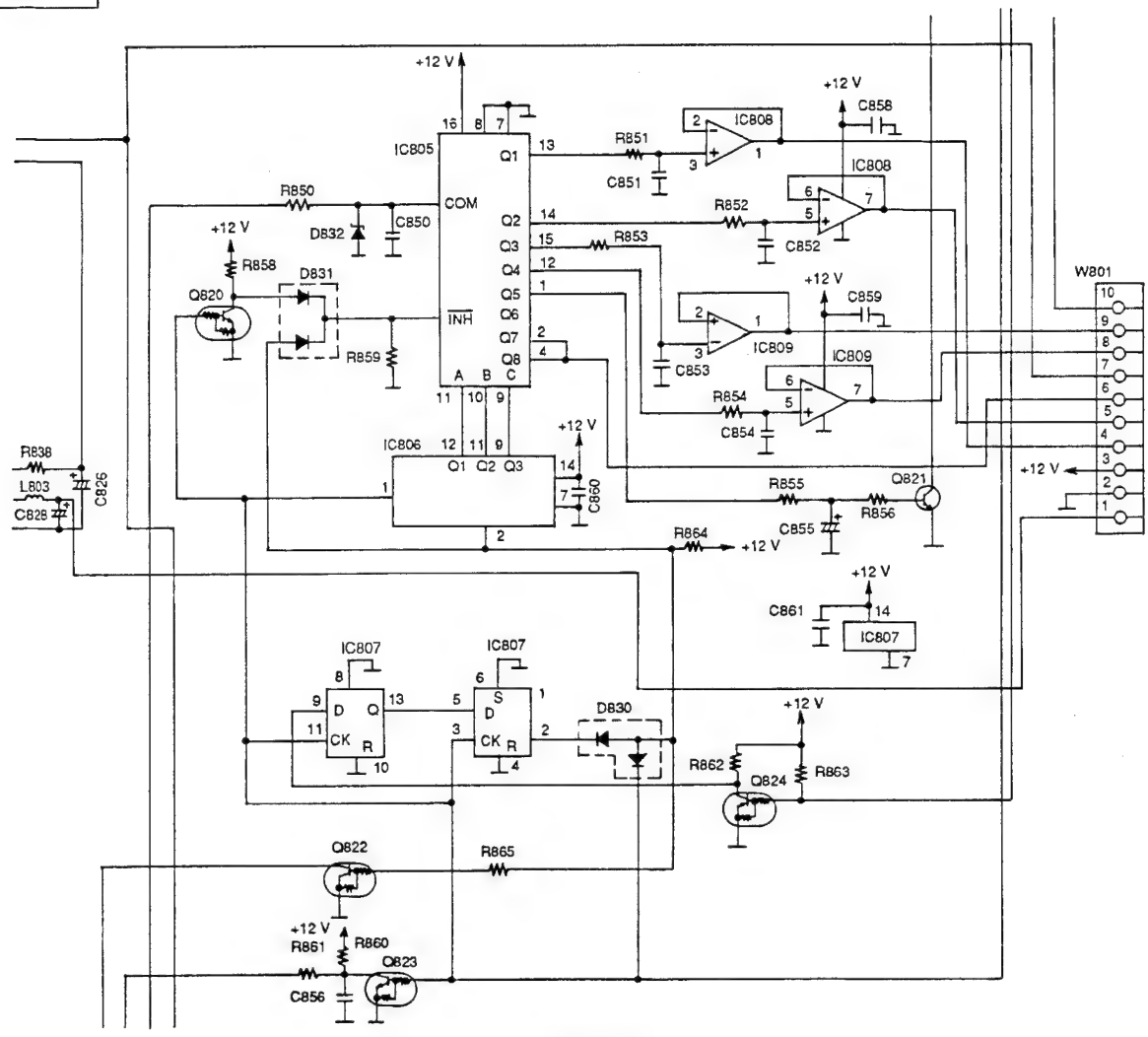


Fig. 50

ADJUSTMENTS

General

Table 1 lists the adjustment Method required for the adjustments below which are to be performed in addition to the adjustments undertaken when the radar system is installed.

These adjustments should be made when;

a. Major components have been replaced

b. An adjustment error is suspected to be the cause of trouble

Table 1 Adjustment Points and Ratings

Adjustment Block	Adjustment Item	Adjustment Point	Check Point & Rating	Remarks
Power Supply Board of Display Unit	Output Voltage	VR302	CN301 pin6 12 VDC (12.1~12.2 VDC)	4-9
CRT display board	Horizontal oscillator frequency	R512	Pin 9 of IC401: 24.325 kHz (23.825~ 24.825 kHz)	4-12-2
	Vertical oscillator frequency	R405	Adjust so that no screen sync misalignment occurs.	4-12.3
	Screen centering	Centering magnet	Adjust the screen center to within 1/16" of the CRT center.	4-12.1

Adjustment Block	Adjustment Item	Adjustment Point	Check Point & Rating	Remarks
CRT display board	Horizontal width	L501	Screen width: $3\frac{25}{32}$"~$3\frac{15}{16}$"	
	Vertical size	R410	Screen height: $4\frac{9}{16}$"~$4\frac{23}{32}$"	
	Vertical linearity	R413	x1, x2: $1\frac{7}{8}$"~$1\frac{31}{32}$" y1, y2: $2\frac{9}{32}$"~$2\frac{11}{32}$"	4-12.4
	Brightness	R510	Operation: Maximum gain, maximum brightness; adjust to level at which the retrace can not be seen.	4-12.5
	Focus	VR531	Adjust for optimal image display.	4-12.6
IF amplifier board	Bandwidth Do not adjust (factory-set)	T601, T602, T603, T604	Adjustment Tuning display level	
		T605	Adjust the level to its maximum in the optimum tuning state.	
Processor board	Picture level adjustment	VR1	IC13 pin 12 level: 0.35~0.40 VDC	4-10
Adjustment board	External speaker volume adjustment	VR151	Optimum level with external speaker connected	4-8
	Tuning display adjustment	VR152	Adjust to display 5 indicators in the optimum tuning state.	4-7
	Range reference adjustment	VR153		4-2
	Tuning adjustment	VR154	Adjust so that the optimum picture is achieved with the front panel tuning knob at the center position.	4-1
	Gain adjustment	VR155	Adjust so that 60% to 80% of the screen is buried by noise signals.	4.4
	A.C.Sea	VR156 (at 12NM range)	Operation: Set the ACS and GAIN controls to their maximum positions. Adjustment: Set for a sensitivity change point of 6NM.	4-7
	Heading adjustment	VR157	Adjust so that the echo from a target dead ahead is aligned with the 0° bearing.	4-3
Antenna unit	Heading adjustment	Mechanical Adjustment		4-3

Adjustment on Installation

The following adjustments should be made at the time of installation.

4-1 Tuning Adjustment
4-2 Range Reference Adjustment
4-3 Heading Adjustment
4-4 Gain Preset Adjustment
4-5 Tuning Indicator Adjustment
4-6 Magnetron Current (Check Only)
4-7 A.C.Sea Adjustment

4-1 Tuning

If the best tuning condition is not obtained with the TUNE control set at its mid- travel, execute the following procedure.

Note: This adjustment is also required when replacing the MIC (microwave integrated circuit) or magnetron.

Procedure:

1. Transmit with the radar on the 3 n.m. range with the TUNE control and A.C.Sea set at its mid-position gain at 2 o'clock and wait about 10 minutes for magnetron oscillator to stabilize.
2. Remove the adjustment cover on the front panel of the display unit.
3. Adjust VR154 , located on the adjustment board, so that a comparatively weak echos from long range targets are discerned with maximum definition.

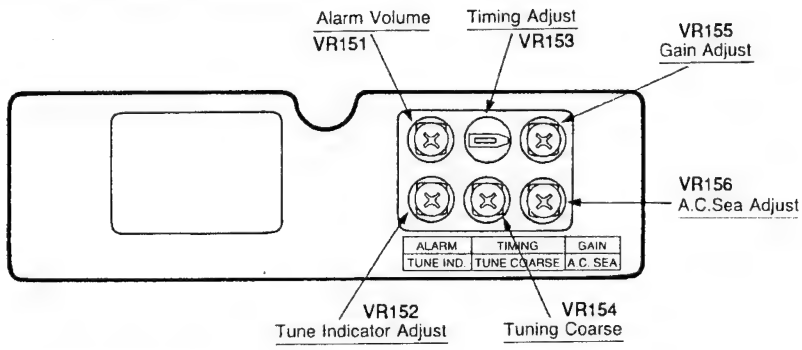


Fig. 51

4-2 Range Reference Adjustment

The reference timing differs with respect to the length of the signal cable. Perform the following adjustment.

1) Set the radar at the 0.25 n.m. range to receive echos.
2) Visually select a straight object, e.g., a harbor wall, straight pier, etc.
3) Adjust VR153 on the ADJUSTMENT board so that the straight object appears straight with no pushing" or "pulling" near the center of the picture. See Fig. 52.

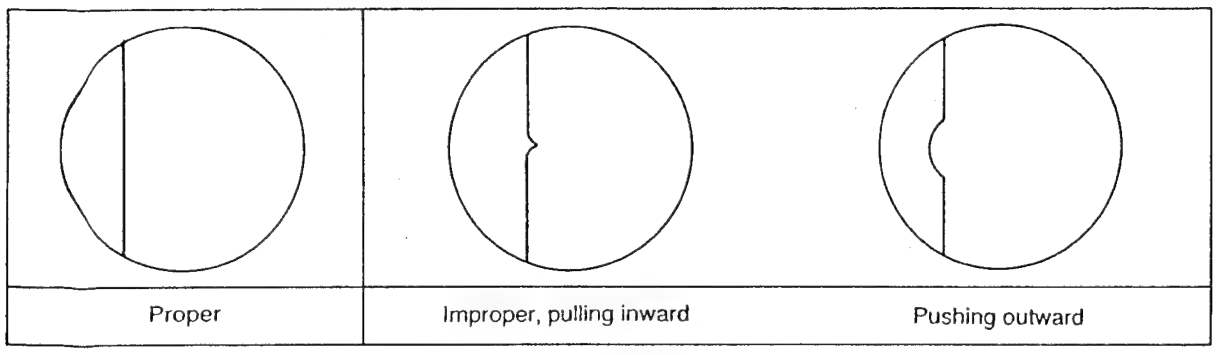
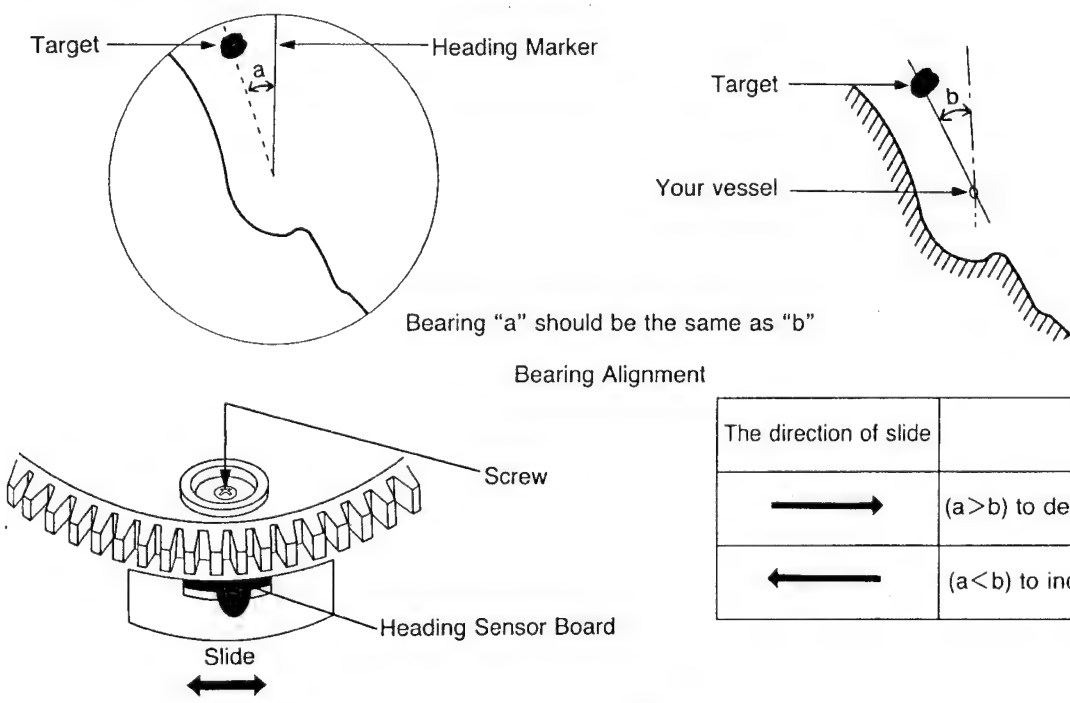


Fig. 52

4-3 Heading Adjustment

Procedure:

1) Operate the radar to obtain a normal display.
2) Select a proper target echo (small island, end of quay, etc.) located on the heading line direction and near the edge of the screen.
3) Set the EBL line to the target, Measure the bearing.
4) Read out the vessel's bearing from the compass, and using a navigational chart find the relative bearing of the target from the vessel's heading.
5) If there is a difference between them adjust the position of the Heading Sensor Board (heading detector) as shown Fig. 53.



The direction of slide	Result
⟶	(a>b) to decrease the angle a
⟵	(a<b) to increase the angle a

Fig. 53.

4-4 Gain Preset Adjustment

Operate the radar and turn the A.C. Sea clutter knob counterclockwise as far as it will go. When the gain knob has been rotated clockwise as far as it will go, proceed with the following adjustment if noise signals do not appear on the CRT screen.

Procedure:

(1) Operate the radar in the 16-mile range.
(2) Turn the gain control clockwise and the A.C.Sea clutter knob counterclockwise on the display unit as far as they will go.
(3) Press the FUNC and IR keys to turn off the interference rejection (IR) mode. Some noise will now appear on the screen. If not, adjust VR155 on the adjustment board (Refer to Fig. 51).
(4) Check that the noise disappears from the screen when the gain knob position is set to within the 2 to 4 o'clock direction.

4-5 Magnetron Current Monitor (Check Only)

1) Operate the radar and set it to the transmit mode.
2) Use a multimeter (for DC voltage measurement) to measure the voltage between TP801 and TP2 (Refer to Fig. 54).
3) Check that the monitor voltage is as follows in the long range mode.

	Voltage between TP801 and TP2
Long mode	1.0 to 2.0 VDC

4-6 Magnetron heater voltage

(Check only upon installation and when magnetron is replaced.)
Check the following before attaching the top cover of the radome

1) Set the radar to the standby mode.
   (Under no circumstances should it be set to the transmit mode.)
2) Use a multimeter (for DC voltage measurement) to measure the voltage across between TP3 and TP4, and check that the voltage is between 5.7 to 6.9 VDC.

Transmitter P.C. Board (PQUP1005ZA-a)

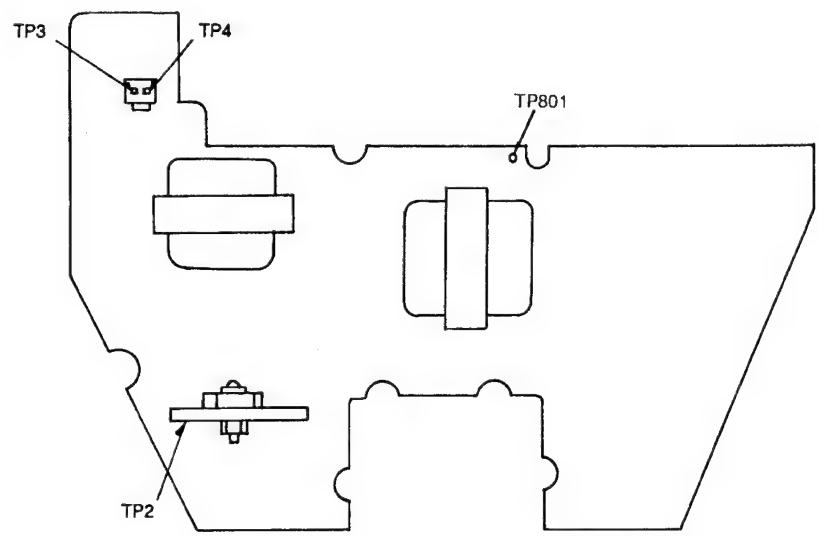


Fig. 54

4-7 Tuning indicator Display Level Adjustment

Preparation
Set the range 16 NM by using the Range up/down key(s).
Set the radar to the transmit mode and turn the TUNE knob to obtain the maximum, indication on the tune indicator so that a target at a long distance is clearly visible. If necessary, adjust the receiver sensitivity using the GAIN knob.

Adjustment
Turn the TUNE IND LEVEL control in the preset window slowly from left to right and set it where level 5 is indicated on the tuning display.
Then move the same control slowly until just before the indicator lights up the indicator for level 6.

4-8 External Alarm Speaker Volume Adjustment

(Perform only when an external speaker is connected.)
Operate the radar and set the alarm zone so as to include echo signals.
(Set the zone using EBL1 and 2 and VRM1 and 2, and press ALARM. Check that the "ALARM" message appears on the CRT. If it does not appear, press ALARM again.)
Use VR151 on the adjust board to adjust the volume to an appropriate level (Refer to Fig. 51).

4-9 DC-DC Converter

Adjustment procedure:
1. Operate the radar.
2. Use a multimeter (for DC voltage measurement) to check the output voltages listed in the table below.

	Monitor CN301 of Power Supply Board or CN1 of Processor Board		Voltages as measured to the unit's ground
+12V	CN301 pin6	CN1 pin6 of Processor Board	12.0V to 12.2V
-12V	CN301 pin8	CN1 pin8 of Processor Board	11.9V to 12.3V
+12V (M)	CN301 pin3	CN1 pin3 of Proccessor Board	11.7V to 11.9V
+5V	CN301 pin5	CN1 pin5 of Proccessor Board	4.75V to 5.25V

If any of the measured values deviate from what is listed above, adjust VR302.
3. Use a frequency counter to check that the output frequency at IC301 pin5 is 90 kHz ±0.5 kHz.
4. Excessive input protection check
Carry out the following check when the DC-DC converter is replaced: gradually increase the primary DC supply voltage to the radar, and when it has exceeded 42V to 44V, check that the JP342 oscillator waveform stops and that the radar itself stops operating.

Power Supply P.C. Board (PQUP1097ZA)

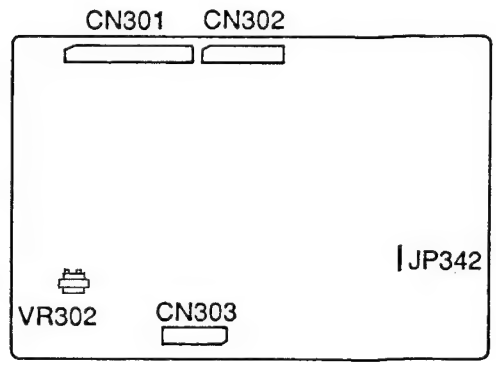


Fig. 55

4-10 Video Leveling Threshold Adjustment

(1) Use a multimeter (for DC voltage measurement) to read out the value at pin 12 of IC13 on the signal processor board.
(2) Adjust VR1 so that the reading on the multimeter indicates between 0.35 V and 0.40 VDC.

Signal Processor P.C. Board (PQUP1107ZA)

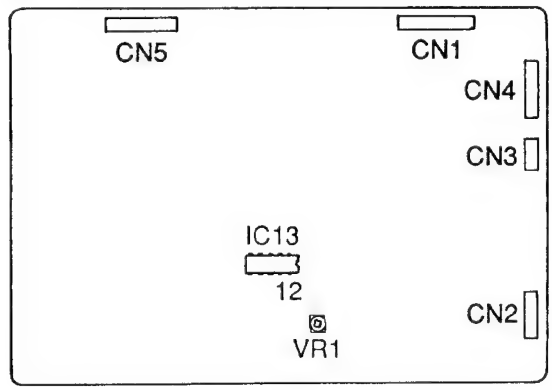


Fig. 56

4-12-1 Vertical Sweep Frequency Adjustment

(1) Proceed with the following adjustment to correct sync misalignment.
(2) Rotate R405 in both the clockwise and counterclockwise directions, and set the control to virtually the center of both points where sync misalignment starts to appear on the screen.

4-12-2 Display Horizontal Sweep Frequency Adjustment

- Use a counter to measure the frequency at pin 9 of IC501 on the display board.
- Adjust R512 to set the frequency to between 23.825 kHz and 24.825 kHz.

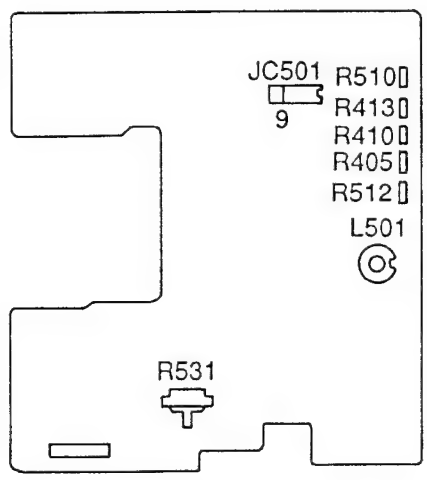


Fig. 57

4-12-3 Sweep Origin Position

(1) Proceed to transmit radar signals and press the BRILL key to adjust the brightness at the CRT sweep center position to the appropriate level.
(2) Rotate the GAIN control and set it so that a very low level of brightness dot at the center of the screen is achieved.
(3) Adjust the magnet ring on the neck of the CRT so that the sweep center comes to within a 1/16" radius of the center of the CRT.

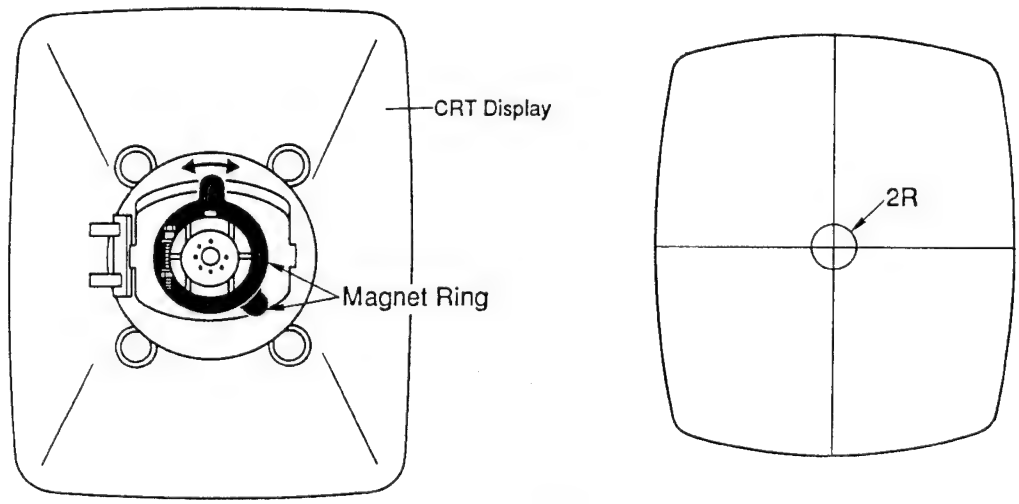


Fig. 58

4-12-4 Horizontal / Vertical Screen Size and Linearity Adjustments:

Adjust L501 and R410 to achieve the following values for the horizontal width (W) and vertical width (H) of the display screen.
W: 3 5/8" to 3 13/16" (92 to 97 mm)
H: 4 7/8" to 5 1/8" (124 to 130 mm)
Adjust VR413 so that x1, x2, y1 and y2 of the screen come within the following ranges:
x1 = x2 1 13/16" to 1 7/8" (46 to 48.5 mm)
y1 = y2 2 7/16" to 2 9/16" (62 to 65 mm)

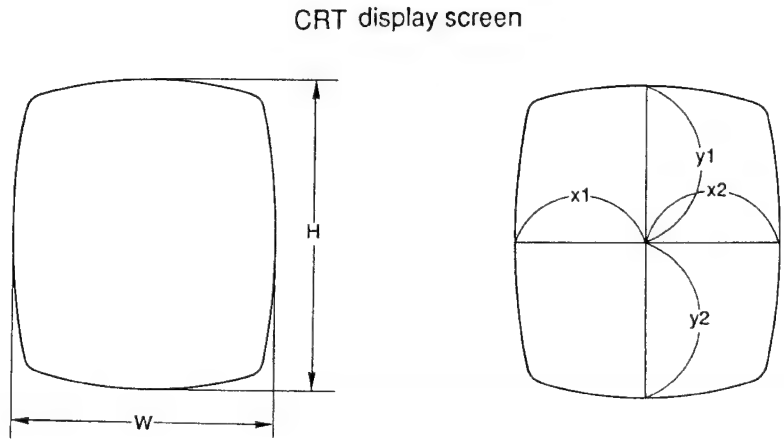


Fig. 59

4-12-5 Brightness Adjustment:

1) Operate the radar.
2) Turn the GAIN control on the display unit clockwise as far as it will go and press the BRILL button to establish the maximum brightness mode.
3) In a dark place (if possible) attach a hood, watch the screen and adjust R510 to a level where the retrace is no longer seen in the no-signal areas (areas without characters or images).

4-12-6 Focus Adjustment

1) Operate the radar and observe a suitable target on the display.
2) Adjust R531 on the display board so that the focus is optimized.
   When adjusting the focus, remove the heat sink and power supply board (keep the connectors connected), and adjust R531 as shown bellow.

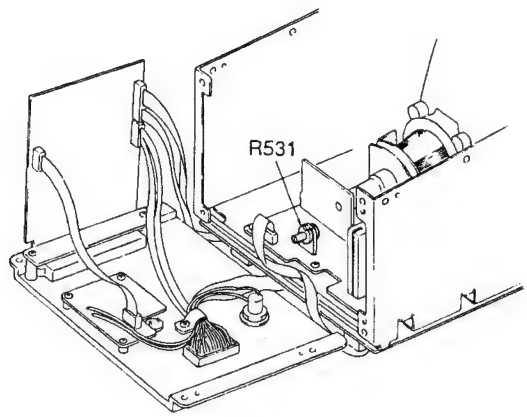
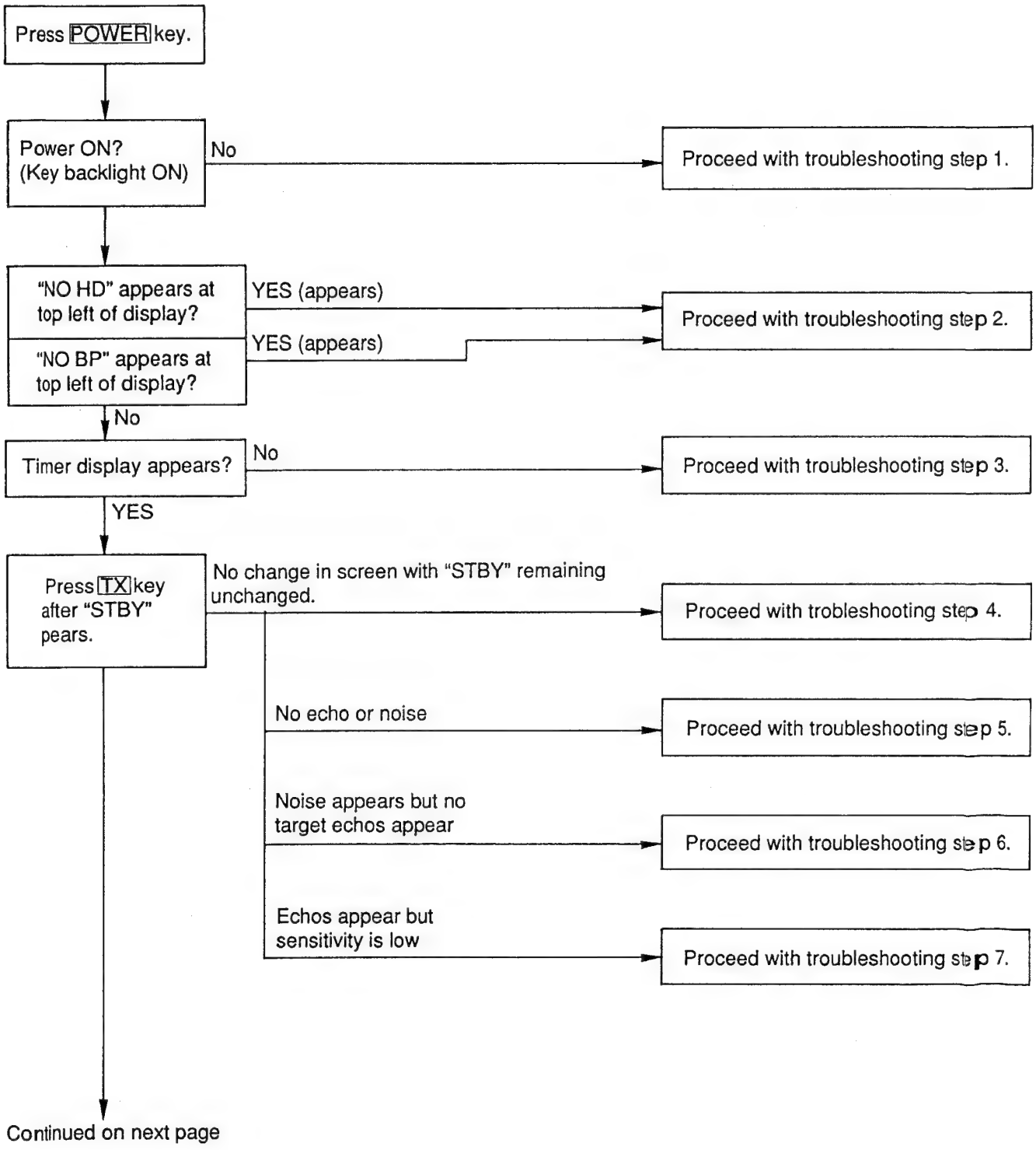
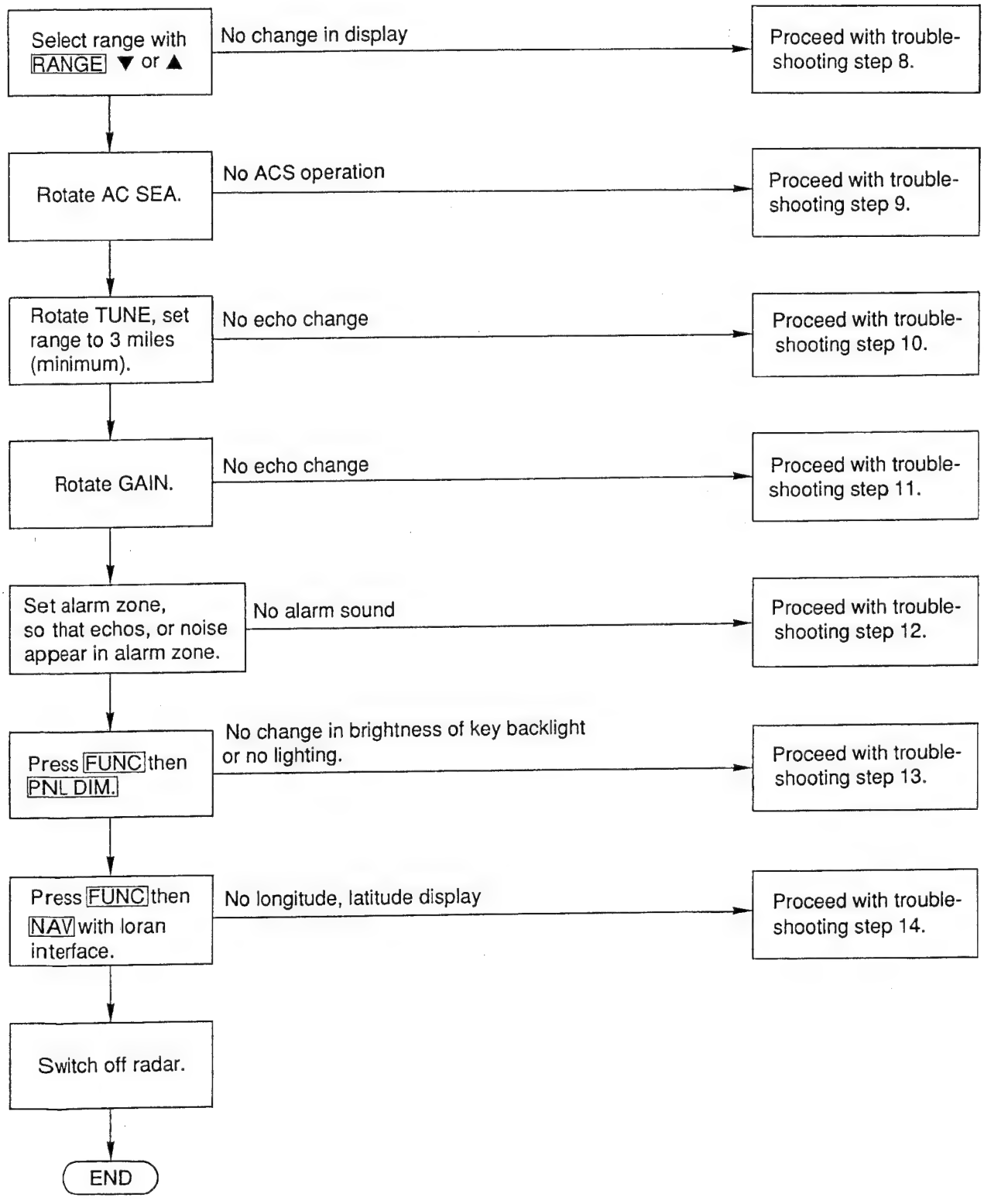


Fig. 60

5. TROUBLESHOOTING GUIDE

5-1 Troubleshooting Flowchart




Select range with RANGE ▼ or ▲
No change in display
Proceed with trouble-shooting step 8.
Rotate AC SEA.
No ACS operation
Proceed with trouble-shooting step 9.
Rotate TUNE, set range to 3 miles (minimum).
No echo change
Proceed with trouble-shooting step 10.
Rotate GAIN.
No echo change
Proceed with trouble-shooting step 11.
Set alarm zone, so that echos, or noise appear in alarm zone.
No alarm sound
Proceed with trouble-shooting step 12.
Press FUNC then PNL DIM.
No change in brightness of key backlight or no lighting.
Proceed with trouble-shooting step 13.
Press FUNC then NAV with loran interface.
No longitude, latitude display
Proceed with trouble-shooting step 14.
Switch off radar.
END

5.2 Troubleshooting Guide

Troubleshooting Step 1: **No power.**

Major Causes:
- o Blown fuse (F301)
- o Vessel battery voltage too high or too low
- o Broken connections in power cable or short circuit
- o Failure on power supply board

Note:
Before checking the P.C. board in the antenna unit, remove the motor set screw, and move the motor to prevent the antenna from rotating.
Also, rotate the antenna by hand from time to time in order to generate a heading signal and apply a reset signal to the signal MPX circuit.

Checks and Repairs

1) Check fuse F301 and replace it (10A) if it has blown.
2) Check the input supply voltage.

Check Point	Rating
Between power cable connector pins 1, 2	10.8 to 42 VDC
Between CN351 pins 1, 2	10.8 to 42 VDC

3) Disconnect the signal cable connector and switch on the power. If the power does not come on or if the fuse "blows," the problem may lie with the power supply board.
4) If power is supplied when the signal cable connector is disconnected, the overload protector in the antenna unit has been tripped. Check out the antenna unit following the troubleshooting procedure.
5) If the voltage between CN303 pins 1 to 4 is normal (10.8 to 42 VDC), check the voltage between the pins below:

Check point	Raiting
CN301 Pins 7 and 6: Approx.	+12VDC
Pins 9 and 6: Approx.	-12VDC
Pins 8 and 6: Approx.	+5VDC

Replace the power supply board if output voltage is not supplied.

Troubleshooting Step 2: **"NO HD" or "NO BP" appears.**

Possible Causes

- o Trouble with the connections of the signal cable connectors (looseness, etc.)
- o Trouble with the CN2 connections on the processor board (looseness, etc.)
- o Failure of motor inside antenna unit
- o Failure of antenna rotation mechanism
- o Missing magnet for heading detection of antenna

Checks and Repairs

- o When both "NO HD" and "NO BP" appear, improper connection or a motor failure may be to blame. Check for looseness in the signal cable connections and connector CN2 connections on the processor board.
- o Switch off the power and remove the antenna radome cover.
- o When only "NO HD" appears, check whether the magnet for detecting the heading is missing and also check the connector CN804 connection. (See Fig. 53)
- o Try rotating the antenna by hand. If it does not turn smoothly, check for damage to the gears and replace if necessary.
- o If the antenna rotates smoothly by hand, a failure in the motor or motor drive section may be to blame.
- o Check the voltage across pins 1 and 2 of connector CN801 on the modulator board. If the voltage is not about 12 VDC, the motor is defective and should be replaced.
  If the voltage is not observed, check the voltage across pins 1 and 3 of connector CN805 on the modulator board. If it is about 12V, the modulator board is defective and should be replaced.

Troubleshooting Step 3: Nothing appears on screen.

Possible Causes

- o CRT high-voltage system failure
- o Processor board failure
- o CRT failure

Checks and Repairs

1) Check that the CRT filament lights. Adjust the R510 brightness control on the display board.
2) If the display does not appear even after the adjustment in 1), check the high-voltage circuit following the steps below.
   a) Switch off the power and, taking care not to receive an electric shock from the high voltage, pull out the CRT anode cap. (Do not touch the electrodes.)
   b) Bring the anode cap electrode to a position about 3/16" from the chassis (metal part). If the high-voltage system is problem-free, a spark will jump between the chassis and electrode.
3) Check the vertical and horizontal sync pulses using a osilloscope. If they are not present, there is a failure on the processor board.

Vertical sync pulse (connector CN4-3 on processor board)

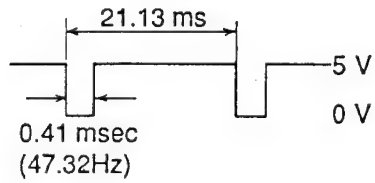


Fig. 61

Horizontal sync pulse (connector CN4 pin 4 on processor board)

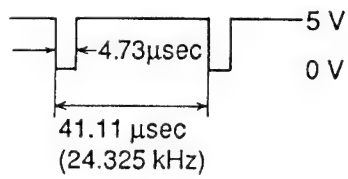


Fig. 62

4) Use the oscilloscope to observe the signal at pin 1 of connector CN4 on the processor board. A pulsed random signal, such as that shown in the figure below, should appear.
   Approx. 5Vp-p

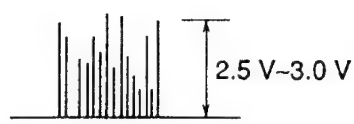


Fig. 63

5) If there is no problem with the checks in 1), 2), 3) and 4) above, the CRT is malfunctioning and should be replaced.

Troubleshooting Step 4: **STBY mode remains even when "TX" is pressed.**

Possible Causes

- o Control board failure
- o Improper connection of connector CN6 on processor board

Checks and Repairs

1) Check whether the CN6 connector on the processor board is loose.
2) Observe the signal of pin 5 of the same CN6 connector on an oscilloscope.
   Check that a pulse train (approx. 100 Hz, 5Vp-p) is observed while the TX key is kept pressed.
   If the pulse train does not appear, the problem may lie in the control board which should be replaced.

Troubleshooting Step 5: **No echos or noise on the screen.**

Possible Causes

1) Problem with video signal connections (open or short)
2) IF amplifier board failure
3) Processor board failure

Checks and Repairs

1) Use a multimeter to check the connections (for continuity/shortcircuiting) of the video signal line in the signal cable connecting the antenna and display units.
2) Use the oscilloscope to check the waveforms at pin 5 of connector CN2 on the processor board.
   A signal such as that shown below should be observed.

Fig. 64

If a signal simular to the above signal is not observed even when the TUNE, A.C. Sea and GAIN controls of the display unit are adjusted, the problem may lie with the IF amplifier board which should be replaced.

3) When the above signal appears normal and no echoes and noise appear on the screen, the problem may lie with the processor board which should be replaced.

Troubleshooting Step 6: Noise appears but no echoes.

Possible Causes

- o Processor Board failure
- o FET Q806 failure
- o Magnetron failure or it has reached the end of its service life
- o Pulse width control circuit failure
- o Pulse transformer T801 failure
- o MIC failure

Checks and Repairs

1) Set the radar to the transmit mode, and use a multimeter to monitor the voltage at the magnetron current monitor point TP801 on the receiver P.C. board.
   Monitor voltage
   If the voltage is between 1.0 and 2.0 VDC (at 4NM range) the problem may lie with MIC which should be replaced.
2) If the magnetron current monitor value is not normal, set the radar to the standby mode and measure the heater voltage at CN806.
   Heater voltage: 5.7 to 6.9 VDC
3) If the heater voltage is normal and the magnetron current monitor signal cannot be obtained, check the signal at trigger output CN2 pin 1 on the processor board.

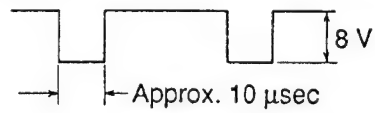


Fig. 65

When this signal cannot be obtained in the transmit mode, the problem may lie in the processor board.

4) If the trigger pulse is generated by the processor board, check the modulator board as follows.

   i) Confirm that the Q806 drain voltage 350 VDC in standly (transmit OFF) condition.
   ii) Set the unit to transmit mode, at 4NM range, and confirm the trigger pulse at below points.

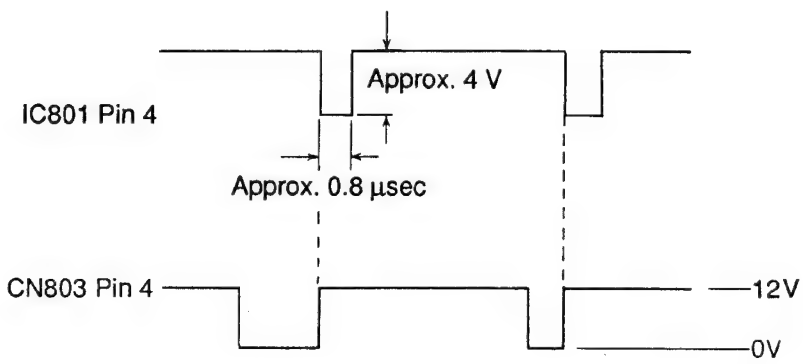


Fig. 66

If the signal at CN803 pin 4 is generated and the signal at IC801 pin 4 is not present, the trigger circuit (Q801, IC801) may be faulty.

iii) If the signal at IC801 pin 4 is present, the Q806 or pulse modulator circuit may be faulty.

Troubleshooting Step 7: Echos appear but low sensitivity.

Causes

- o Trouble in MIC 5V regulator (IF amplifier Q610)
- o MIC failure
- o End of magnetron's service life

Checks and Repairs

1) Check that the voltage at connector to MIC pin 4 from the IF amplifier is 5V ±0.2V. If it deviates greatly from 5V, the power regulator Q610 circuit may have failed.
2) Check the magnetron current using the procedure in troubleshooting step 6-(1). If there is a problem, the magnetron may have reached the end of its service life and should be replaced.

Troubleshooting Step 8: No change in range with range Up / Down Key (Range ▼) (Range▲).

Possible Causes

- o Improper connection of connector CN6 on the processor board
- o Control board failure

Checks and Repairs

1) Check the connector CN6 connections on the processor board.
2) Use an oscilloscope to check the signals at pins 8 and 9 of connector CN6 on the processor board (100 Hz, 5Vp-p pulse train). If the signal does not appear, the processor board has failed.
3) Use an oscilloscope to check the signal at pin 6 of connector CN6 on the processor board. Check that a pulse train (approx. 100 Hz, 5Vp-p) appears while the key is pressed. If it does not appear, the control panel has failed.

Troubleshooting Step 9: No A.C. Sea operation.

Possible Causes

- o Improper connection of CN205 on the control board
- o Improper connection of CN151 on preset board
- o IF amplifier A.C. SEA circuit Q609 failure

Checks

1) Check the voltage at pin 12 of IC49 on the processor board.
   Rotate the A.C. Sea control and check that the voltage changes between approximately 6.5 V and 8 Vdc.
   If the voltage does not change, check the connections of CN151 on the preset board and of the CN205 on the control board.
2) Check the waveform at pin 3 of IC602 on the IF amplifier board.
   The conditions at this time are:
   - o Radar in the transmit mode
   - o GAIN control clockwise as far as it will go

   If the A.C. Sea waveform is not observed, it means that the IF amplifier A.C.Sea circuit has failed.

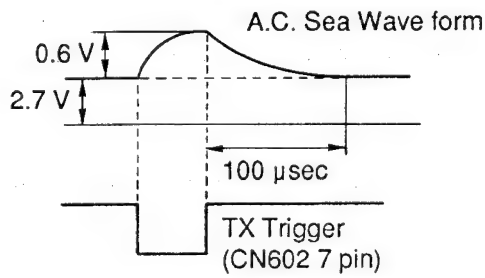


Fig. 67

Troubleshooting Step 10: No change in echo even when TUNE control knob is turned.

Possible Causes

- o Improper connection of VR201 on the control board and of VR154 on preset board
- o Failure of tuning circuit (IC604, Q611) on IF amplifier board
- o MIC failure

Checks

1) Check the voltage at pin 13 of the IC49 on the processor board. When the TUNE (VR201) control is turned, the voltage should change across a range from about 0 to 6 VDC. If it does not change, check the connections of the VR201 control.
2) Check the voltage at pin 14 of the IC49 on the processor board. When VR154 on the preset board is turned, the voltage should change across a range from about 0 to 7 VDC. If it does not change, check the connections of the VR154 control.
3) Check the voltage at pin 4 of connector to MIC on the IF amplifier. When VR154 on the preset board is turned, the pin 5 voltage should change across a range from about 3 to 25 VDC.
4) When the TUNE control is turned, the connector CN601 pin 4 voltage should change by a margin of about 2 V or more.
5) The tuning circuit of the IF amplifier has failed if the desired results are not obtained in 3) or 4).
6) When the desired results are obtained in 3) and 4), a MIC failure is assumed if a 5V supply voltage is supplied to pin 3 of the CN601.

Troubleshooting step 11: **No change in echo or noise even when GAIN cotrol is adjusted.**

Possible Causes

- o Improper connection of GAIN control, VR155 on preset board
- o IF amplifier failure

Checks

1) Check the voltage at pin 15 of IC49 on the processor board. It should change to approx. 8 to 9.5 Vdc when the GAIN control is turned. If there is no change, check the connections at the GAIN control and of VR155 on the preset board.
2) Check the voltage at connector CN602 pin 9 of the IF amplifier. If there is the same change as in 1), the IF amplifier may have failed.

Troubleshooting step 12: **No alarm tone.**

Causes

- o Failure of alarm amplifier circuit (Q11) on processor board
- o Failure of alarm amplifier circuit (Q4, Q22, Q24) on processor board
- o Failure of alarm circuit (IC29) on processor board
- o Improper connection of VR151 on preset board
- o Improper connection of external speaker

Checks

(Set the alarm zone and proceed in the alarm mode.)

1) If the built-in alarm is problem-free and no sound is heard through the external speaker (option), check the external speaker connections.
2) Use an oscilloscope to check the signal of wire W1 #6 on the processor board. It should be pos sible to observe a pulse train (approx. 2 kHz, 5Vp-p). If this signal is not present, the processor board has failed.
3) If the signal in 2) is problem-free, check the wire W1 #7 signal. If a pulse train (approx. 2 kHz, 2Vp-p) is not observed even when VR151 on the preset board is turned clockwise, check the VR151 connections on the preset board.
4) Check that the signal in 3) is problem-free and check the signal at connector CN7 pin 1 for the external speaker. If a pulse train (2 kHz, 5Vp-p) is not observed, the amplifier circuit (Q4, Q22, Q24) on the processor board has failed.
5) Use the oscilloscope to observe the signal of IC31 pin 63 on the processor board. A pulse train (5Vp-p, 2 kHz) should appear. If not, the processor board has failed.
6) Use an oscilloscope to observe the signal of cable W2 #2 for connecting the buzzer element. A signal (approx. 3Vp-p, 2 kHz) should be observed. If the signal is present, the element has failed; If it is not present, Q11 on the processor board has failed.

Troubleshooting step 13: **No change in key backlight brightness or no lighting.**

Possible causes

- o Open filament in lamps PL201-206
- o Control panel Q201 failure
- o Processor board TR5 failure
- o Processor board IC27 failure
- o Key switch failure

Checks

1) When the backlight does not come on, connect the emitter of Q201 on the control board to GND. An open filament in a lamp is to blame if the lamps do not light.
2) Monitor pin 3 of connector CN6 on the processor board. A pulse train (approx. 100 Hz, 5Vp-p) should be observed while the PNL DIM key is kept pressed. If it is not observed, the control board has failed.

3) Use an oscilloscope to monitor the waveform at IC27 pin 17 (OUT2).

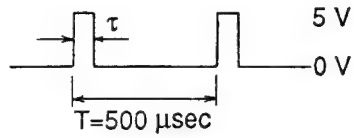


Fig. 68

Check that the duty cycle of the above signal changes each time the dimmer key is pressed. If it dose not change, it means that IC27 has failed.

4) Use an oscilloscope to observe the signal at pin 3 of connector CN5 on the processor board.

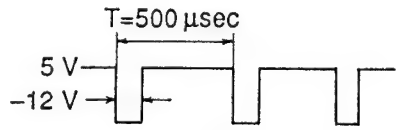


Fig. 69

Check that the duty cycle of the above signal changes each time the dimmer key is pressed. If it changes, it means that transistor Q201 on the control board has failed; if not, it means that Q5 on the processor board has failed.

Troubleshooting Step 14: No longitude, latitude display even when set to navigation mode.

Possible Causes

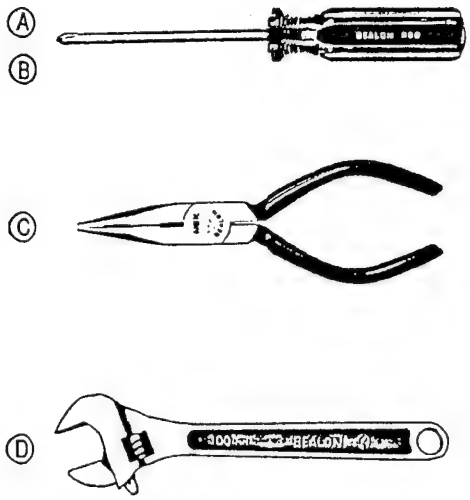
- o Improper operation of externally connected loran system
- o Improper connection of interface cable with loran system
- o Failure of photocoupler IC44 used for interface
- o Microcomputer IC1 failure

Checks

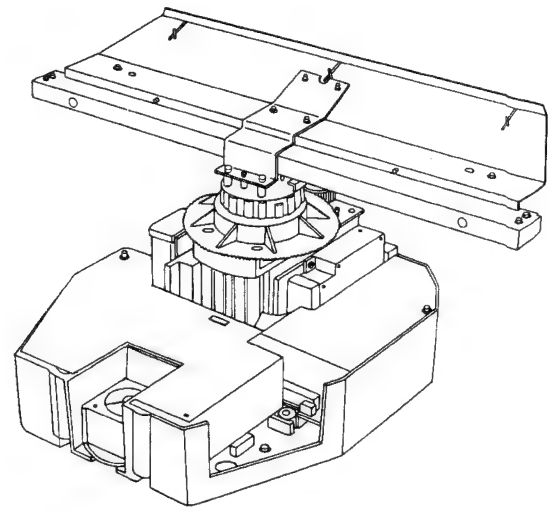
1) Check that the loran system is functioning properly.
2) Check that the proper connections have been made with connectors CN303 and CN3.
3) Use an oscilloscope to check the signal at IC1 pin 55. A 5Vp-p pulse train should be observed. If it is not observed, photocoupler IC44 has failed; if it is observed, IC1 on the processor board has failed.

TOOLS FOR SERVICING

Special tools which are made of copper beryllium (non magnetic) for servicing the antenna unit (Model KX-G8100DM).



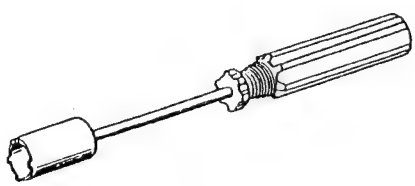
	Part No.	Part Name
Ⓐ	PQZZ1G8300M	+Screwdriver for M3 screws
Ⓑ	PQZZ2G8300M	+Screwdriver for M4 screws
Ⓒ	PQZZ3G8300M	Electrician's pliers
Ⓓ	PQZZ4G8300M	Adjustable crecent wrench



(Model KX-G8100DM)

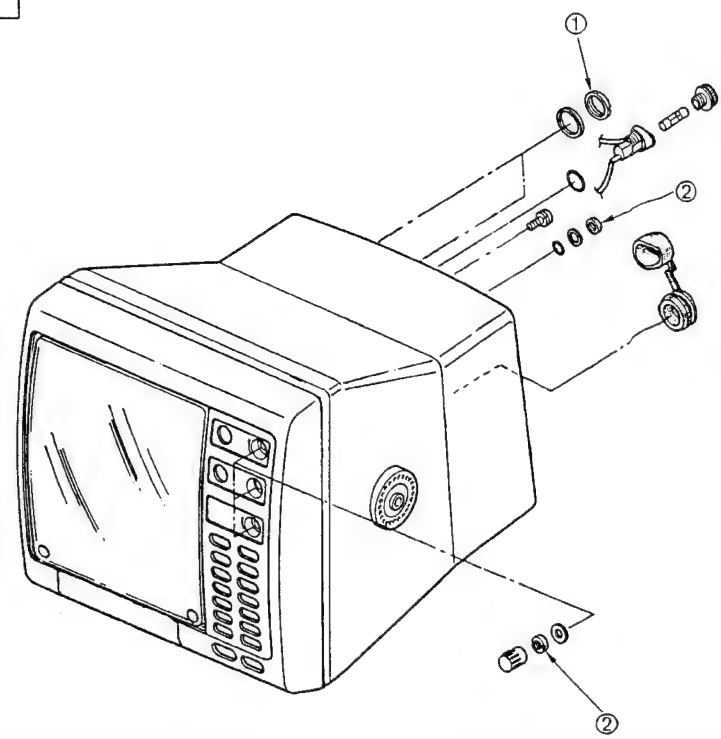
Fig. 70

Special tool for easy remove of the nuts.



Nut driver

Nut	Part No. of Nut driver
①	PQZZ1G2220M
②	PQZZ2G2220M

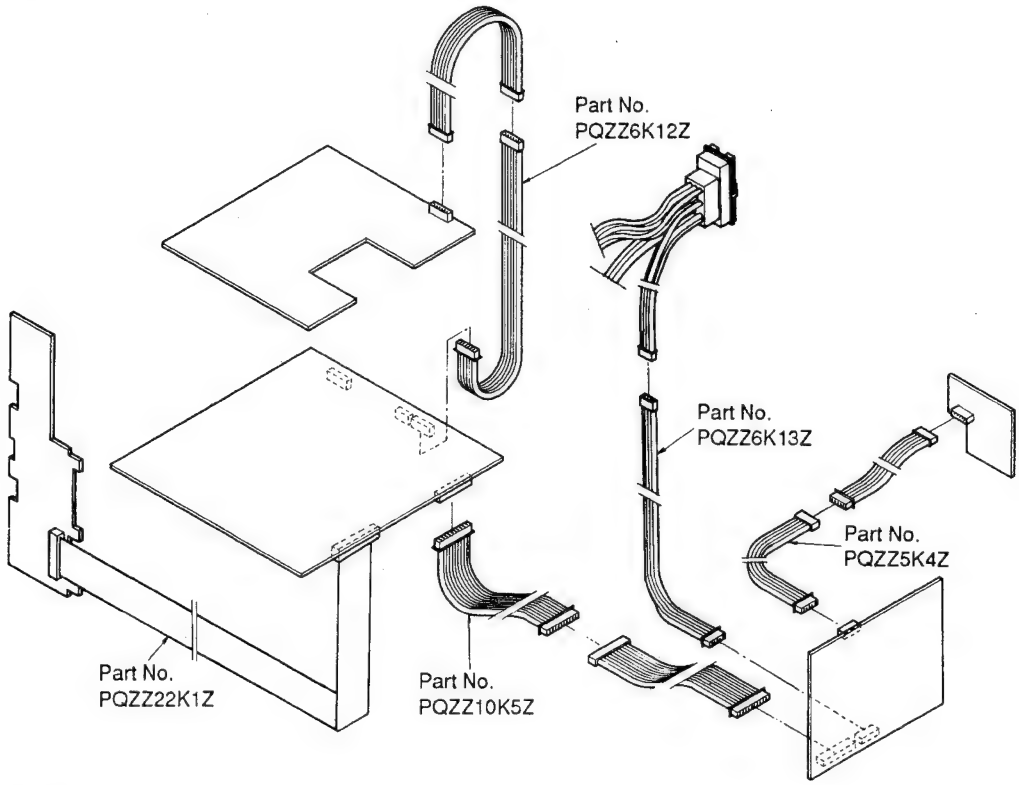


(Model KX-G8100MO)

Fig. 71

SERVICE EXTENSION CORD CONNECTING METHOD

Model KX-G8100MO



Model KX-G8100DM

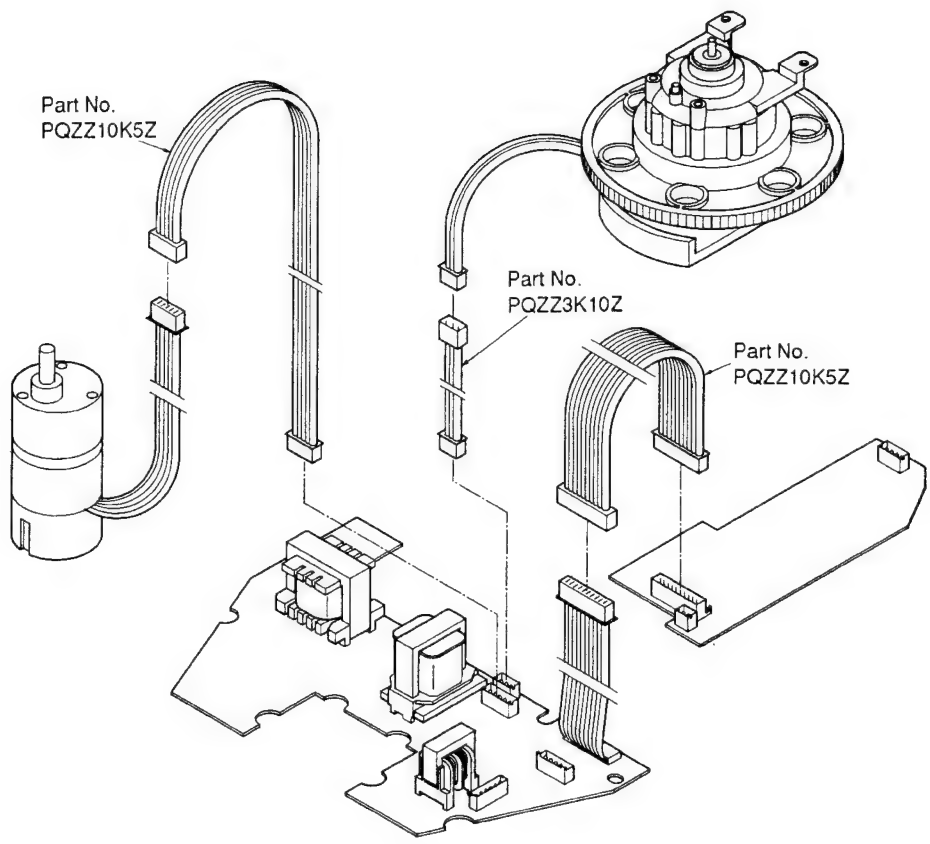


Fig. 72

CABINET AND ELECTRICAL PARTS LOCATION (MODEL **KX-G8100MO**)

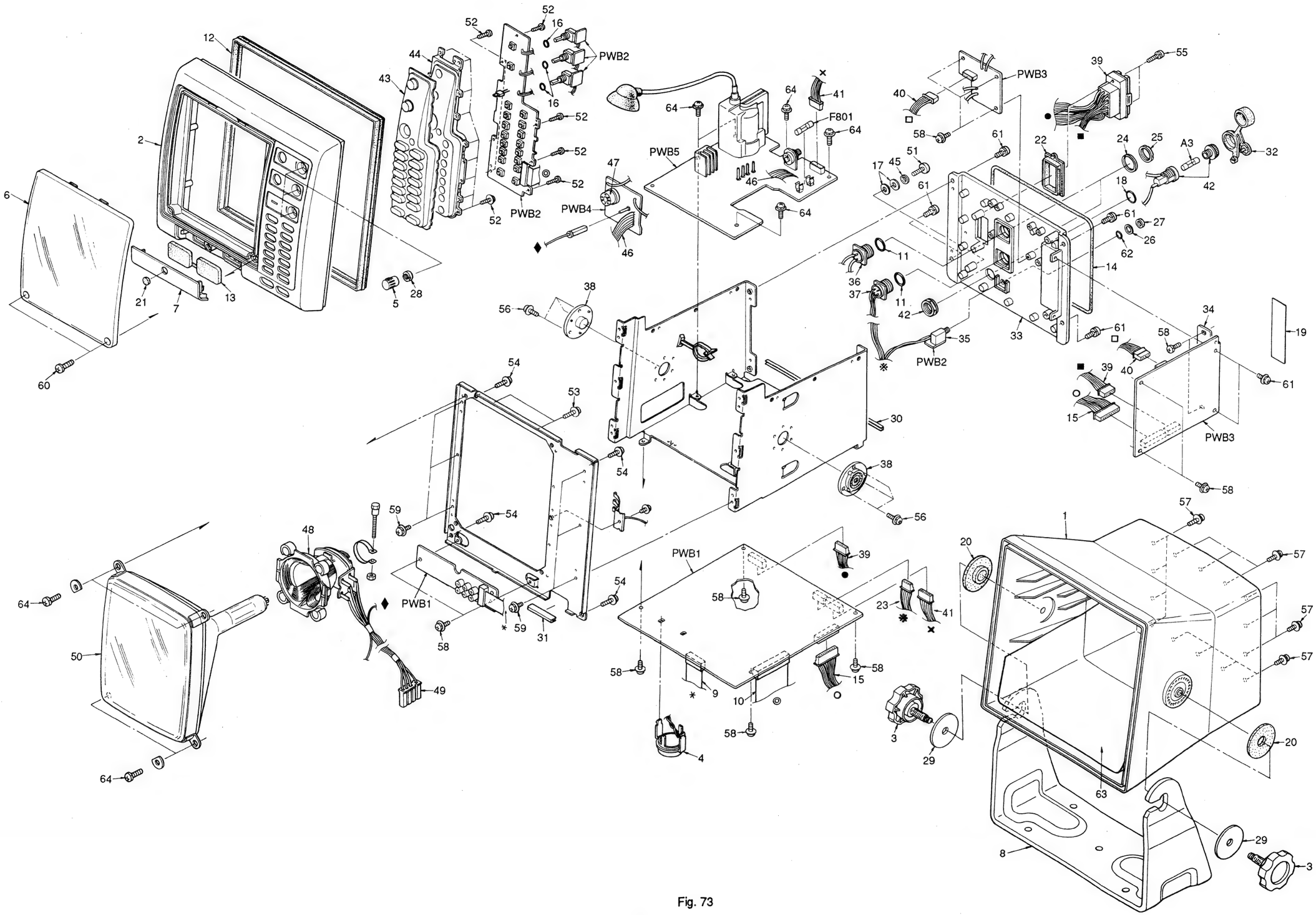


Fig. 73

CABINET AND ELECTRICAL PARTS LOCATION (MODEL **KX-G8100DM**)

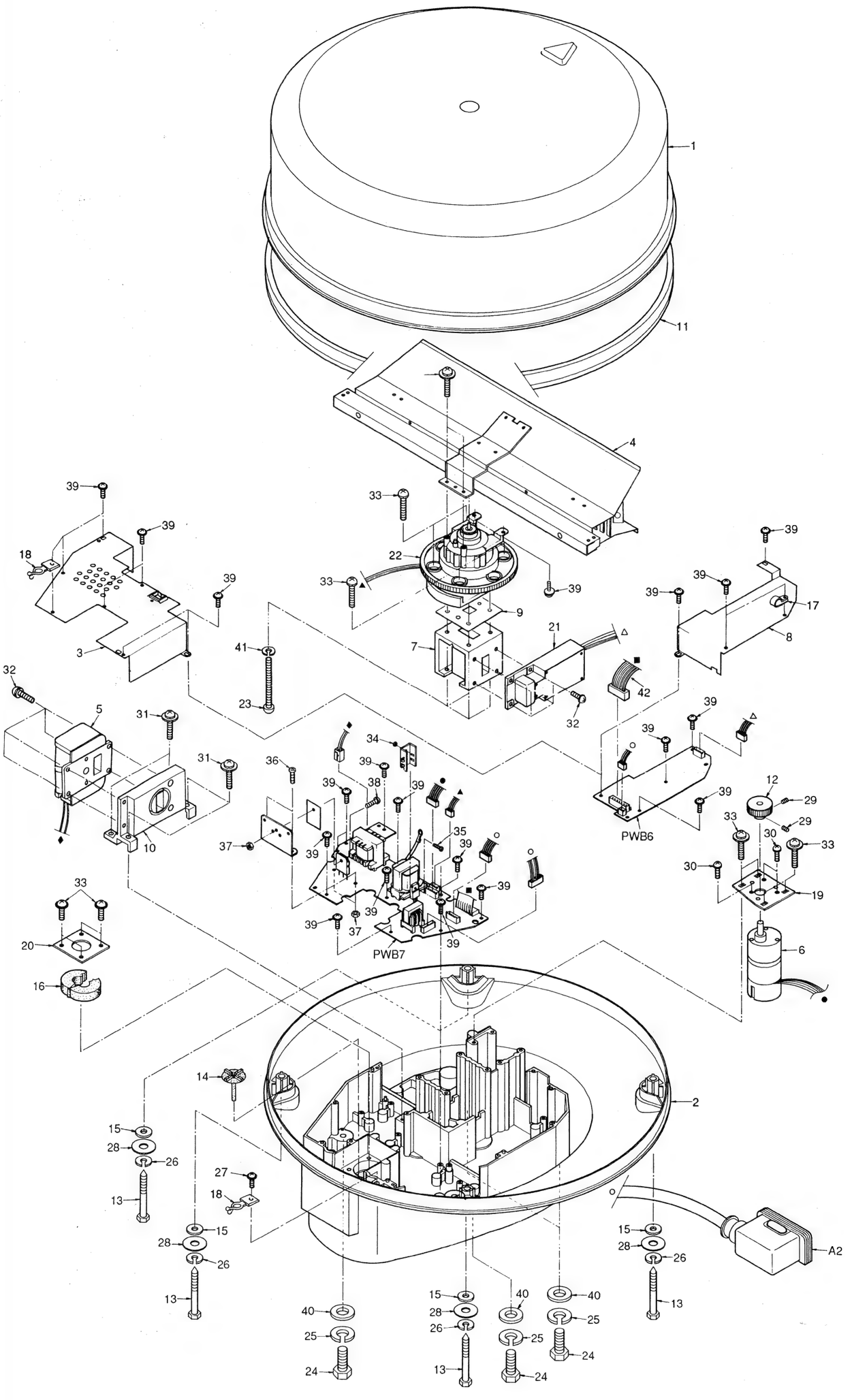


Fig. 74

HOW TO CHECK THE CRT DISPLAY FOR SERVICING

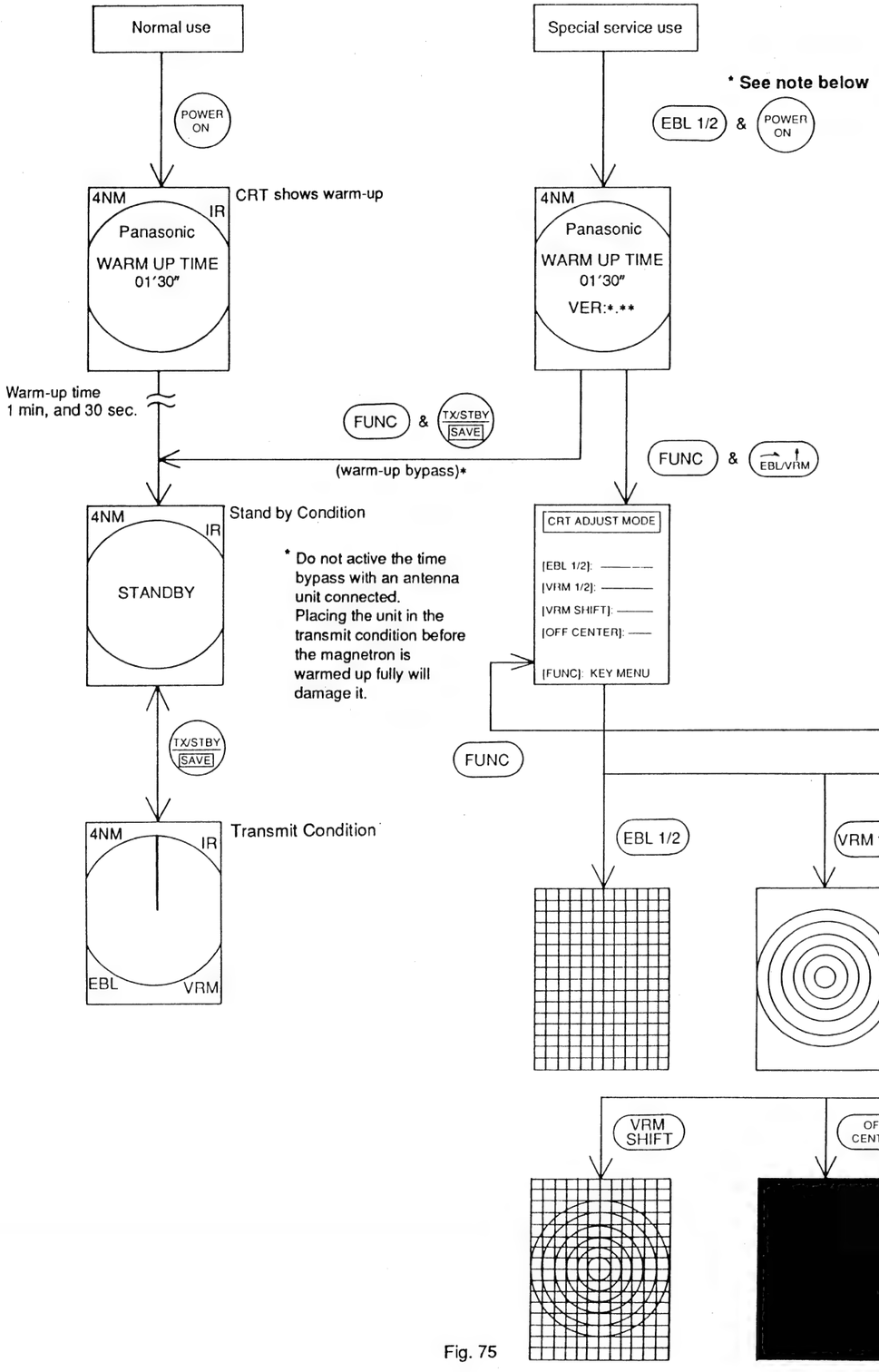


Fig. 75

ACCESSORIES AND PACKING MATERIALS

Model KX-G8100DM

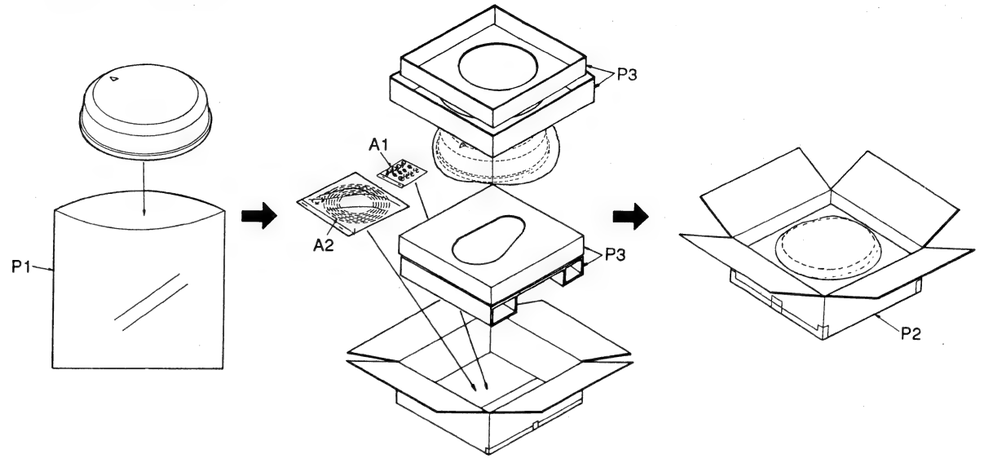


Fig. 76

Model KX-G8100MO

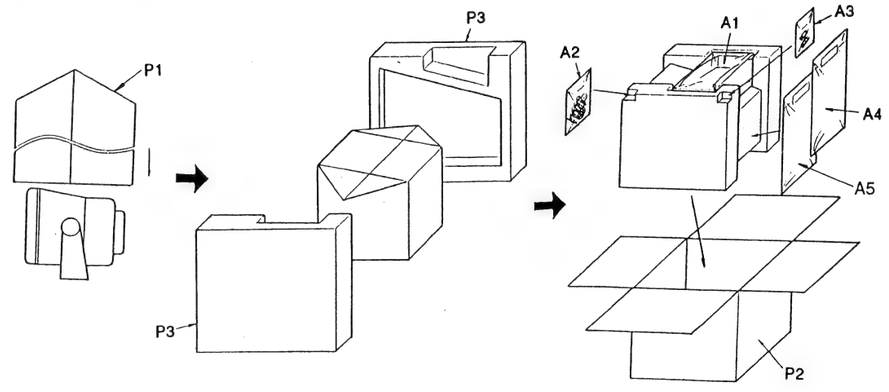


Fig. 77

REPLACEMENT PARTS LIST

Model KX-G8100M0

Notes:
1. Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.
2. Important safety notice.
   Components identified by the ⚠ mark special characteristics important for safety. when replacing any of these components, use only manufacture's specified parts.
3. The S mark indicates service standard parts and may differ from production parts.
4. RESISTORS & CAPACITORS
   Unless otherwise specified.
   All resistors are in ohms(Ω) k=l000Ω,M=l000kΩ
   All capacitors are in MICRO FARADS(μF) P=μμF
   *Type &Wattage of Resistor
   Type

ERC:Solid	ERX:Metal Film	PQ4R:Carbon
ERD:Carbon	ERG:Metal Oxide	ERS:Fusible Resistor
PQRD:Carbon	ER0:Metal Film	ERF:Cement Resistor

Wattage

10,16:1/8W	14,25:1/4W	12:1/2W	1:1W	2:2W	3:3W

*Type & Voltage of Capacitor
Type

ECFD:Semi-Conductor	ECCD,ECKD,ECBT,PQCBC : Ceramic
ECQS:Styrol	ECQE,ECQV,ECQG : Polyster
PQCUV:Chip	ECEA,ECSZ : Electrolytic
ECQMS:Mica	ECQP : Polypropylene

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H: 50V	05: 50V	0F:3.15V	0J :6.3V	1V :35V
2A:100V	1:100V	1A:10V	1A :10V	50,1H:50V
2E:250V	2:200V	1V:35V	1C :16V	1J :63V
2H:500V		0J:6.3V	1E,25:25V	2A :100V

Ref. No.	Part No.	Part Name & Description	Pcs
		CABINET AND ELECTRICAL PARTS	
1	PQYFG8100M0M	REAR CABINET ASS'Y	1
2	PQYGG8100M0M	GRILLE ASS'Y	1
3	PQYTG8300M0M	KNOB BOLT ASS'Y	2
4	PQWHG8100M0M	BUZZER ASS'Y	1
5	PQBN17Y	KNOB,RECIVER TUNING, A.C.SEA ETC.	3
6	PQGP88Z	PANEL	1
7	PQKK52Z	COVER	1
8	PQKL30Z	BRACKET	1
9	PQJE132Z	FLAT CABLE	1
10	PQJE133Z	FLAT CABLE	1
11	PQHG729Z	PACKING	2
12	PQHG926Z	PACKING	1
13	PQHG928Z	PACKING	1
14	PQHG929Z	PACKING	1
15	PQJS10M47Z	CONNECTOR, 10P	1
16	PQHG935Z	PACKING	3
17	XWG4VW	WASHER	1
18	PQHG938Z	PACKING	1
19	PQHG939Z	RUBBER, TRANSISTOR	1
20	PQHG941Z	RUBBER, KNOB BOLT	2
21	PQHG954Z	RUBBER, CAP	1
22	PQHG961Z	PACKING	1
23	PQJS4K30Z	CONNECTOR, 4P	1
24	PQHM108Y	WASHER	2
25	PQHM109Z	NUT	2
26	PQHM38Z	WASHER	1
27	PQHM61Z	NUT	1
28	RHE7030Z	NUT	3
29	PQHR9440Z	WASHER	2
30	PQHR9476Z	COVER	1
31	PQHR9784Z	COVER	1
32	PQHG975Z	PACKING	1
33	PQMY77Z	HEAT SINK	1
34	PQMY78Z	HEAT SINK	1
35	PQJJ1D4Y	JACK, EXTERNAL ALARM SPEAKER	1
36	PQJJ1J6Z	JACK, DC IN	1
37	PQJJ1J7Z	JACK, LORAN RECEIVER	1
38	PQZEG8300M0M	NUT ASS'Y	2
39	PQJS24R32Z	CONNECTOR, 24P	1
40	PQJS5M33Z	CONNECTOR, 5P	1
41	PQJS6M37Z	CONNECTOR, 6P	1
42	PQJV3Z	HOLDER, FUSE	1
43	PQSE109Z	SWITCH, KEY	1
44	PQDH14Z	OPTIC CONDUCTIVE	1
45	XWA4BVW	WASHER	1
46	PAJS3A825	CONNECTOR	1
47	PAJS3B5010	CONNECTOR	1
48	PALY30317D	PROPENSITY COIL	1
49	PAXFJT0290702	4P COUPLER	1
50	7BTY39N	CATHODE RAY TUBE	1
51	XSN4D10VW	SCREW	1
52	XTW26+8F	SCREW	27
53	XTW3+12S	SCREW	2
54	XTW4+12S	SCREW	4
55	XYN3+C16VW	SCREW	2
56	XYN3+C8	SCREW	6
57	XYN3+F10VW	SCREW	14
58	XYN3+F6	SCREW	13
59	XYN3+F8	SCREW	6
60	XYN3+J10VNK	SCREW	2
61	XYN4+C8	SCREW	6
62	PQHG727Z	PACKING	1
63	PQMC190Z	SHEILO COVER	1
64	XYN4+F8	SCREW	8
		ACCESSORIES AND PACKING MATERIALS	
A1	PQYEG8300M0M	HOOD ASS'Y	1
A2	PQZMG8300M0M	BOLT ASS'Y	1
A3	XBA1C60NU100	FUSE	3
A4	PQQX6558Z	INSTRUCTION BOOK	1
A5	PQJS2A31Z	POWER CABLE	1
P1	PQPH79Z	PROTECTION COVER	1
P2	PQPK1348Z	PACKING CASE	1
P3	PQPN9058Z	PAD	1
		SIGNAL PROCESSOR BOARD PARTS	
PWB1	PQWP18100M0M	SIGNAL PROCESSOR P.C.BOARD ASS'Y (NLA)	
		(ICs)	
IC1	PQVI180XA25F	IC	1
IC2	PQVISN7L14N	IC	1
IC3	PQVISN7L04N	IC	1
IC4	PQVIPS520D	IC	1
IC5	PQVISN7L32N	IC	1
IC6	PQVISN7L138N	IC	1
IC7	PQVIMB672191	IC	1
IC8	PQVIN74F04N	IC	1
IC9,19, 22, 47,51	PQVIN74F74N	IC	5
IC10	PQVIN74F32N	IC	1
IC11,24	PQVIN74F161N	IC	2
IC12	PQVI012CW446	IC	1
IC13,15	PQVIMC1414P	IC	2
IC17	PQVIN74F112N	IC	1
IC18,151	PQVISN7L221N	IC	2
IC20,41	PQVIN74F02N	IC	2
IC21	PQVIN74F10N	IC	1
IC23	PQVICX5416PA	IC	1
IC25	PQVICX72020P	IC	1
IC26	PQVI672464SH	IC	1
IC27	PQVIMS8C53R2	IC	1
IC28	PQVISN7L123N	IC	1
IC29	PQVISN7L08N	IC	1
IC30	PQVISN7L245N	IC	1
IC31	PQVI013GFA63	IC	1
IC32	PQVISN7L86N	IC	1
IC33,34	PQVIKM1C464D	IC	2
IC35	PQVIKM2C256D	IC	1
IC40	PQVITC4066BP	IC	1
IC41	PQVITC7A32P	IC	1
IC43	PQVIHD4046BP	IC	1
IC46	PQWIG8300M0M	IC ASS'Y	1
IC48	PQVIN74F153N	IC	1
IC49	PQVITC4051BP	IC	1
IC50	PQVITC4024BP	IC	1
IC152	PQVISN7L00N	IC	1

Ref. No.	Part No.	Part Name & Description	Pcs
		(PHOTO ELECTRIC TRANSDUCER)	
IC44	PQVITLP521	PHOTO ELECTRIC TRANSDUCER	1
		(TRANSISTOS)	
Q1,6,17-20 25,26	DTC143EA	TRANSISTOR(SI)	8
Q2-4,7,8, 10,12,14, 15,16,21 22,171	2SC1740S	TRANSISTOR(SI)	13
Q5,9,11, 13,27	2SA933	TRANSISTOR(SI)	5
Q23	2SD1858R	TRANSISTOR(SI)	1
Q24	2SB1322	TRANSISTOR(SI)	1
		(DIODES)	
D1,3,5,7 11-13,15 22,23, 25-27	1SS131	DIODE(SI)	13
D8	MA4068	DIODE(SI)	1
D9,21	MA4130	DIODE(SI)	2
D10,14	MA4051	DIODE(SI)	2
D19	EZCDB4D220M	DIODE(SI)	1
D24	MA4024	DIODE(SI)	1
		(CRYSTALS)	
X1	PQVBA12.2T1	CRYSTAL	1
X2	PQVCK210525N	CRYSTAL	1
X4	PQVCK16625N4	CRYSTAL	1
X171	PQVCK6216N3Z	CRYSTAL	1
		(COILS)	
L1	PQLQZK561K	COIL	1
L171	PQLQZMR56K	COIL	1
		(VARIABLE RESISTORS)	
VR1	EVNDXAA03B13	VARIABLE RESISTOR, 1K (B)	1
VR151,154, ,155,156	EVM38GA00B53	VARIABLE RESISTOR, 5kΩ (B)	4
VR152	PQNB3A00B54M	VARIABLE RESISTOR, 50kΩ (B)	1
VR153	EVN38CA00B14	VARIABLE RESISTOR, 10kΩ (B)	1
		(RESISTORS)	
R1	ERDS2TJ103	10K	1
R2	ERDS2TJ103	10K	1
R3	ERDS2TJ103	10K	1
R4	ERDS2TJ103	10K	1
R5	ERDS2TJ103	10K	1
R6	ERDS2TJ103	10K	1
R7	ERDS2TJ103	10K	1
R8	ERDS2TJ103	10K	1
R9	ERDS2TJ103	10K	1
R10	ERDS2TJ103	10K	1
R11	ERDS2TJ103	10K	1
R12	ERDS2TJ103	10K	1
R13	ERDS2TJ332	3.3K	1
R14	ERDS2TJ332	3.3K	1
R15	ERDS2TJ332	3.3K	1
R16	ERDS2TJ332	3.3K	1
R17	ERDS2TJ103	10K	1
R18	ERDS2TJ332	3.3K	1
R19	PQ4R10XJ223	22K	1
R20	PQ4R10XJ222	2.2K	1
R21	ERDS2TJ221	220	1
R22	ERDS2TJ221	220	1
R23	ERDS2TJ331	330	1
R24	ERDS2TJ121	120	1
R25	ERDS2TJ181	180	1
R26	ERDS2TJ271	270	1
R27	ERDS2TJ391	390	1
R28	ERDS2TJ561	560	1
R29	ERDS2TJ821	820	1
R30	ERDS2TJ123	12K	1
R31	ERDS2TJ102	1K	1
R33	ERDS2TJ102	1K	1
R35	ERDS2TJ102	1K	1
R37	ERDS2TJ102	1K	1
R38	ER016CKF1502	15K	1
R39	ERDS2TJ103	10K	1
R40	PQ4R10XJ223	22K	1
R41	PQ4R10XJ222	2.2K	1
R42	PQ4R10XJ103	10K	1
R43	ERDS2TJ103	10K	1
R44	PQ4R10XJ683	68K	1
R45	ERDS2TJ223	22K	1
R46	ERDS2TJ103	10K	1
R47	ERDS2TJ820	82	1
R50	ERDS2TJ562	5.6K	1
R51	ERDS2TJ683	68K	1
R52	ERDS2TJ153	15K	1
R53	ERDS2TJ182	1.8K	1
R54	ERDS2TJ331	330	1
R55	ERDS2TJ273	27K	1
R56	ERDS2TJ471	470	1
R57	ERDS2TJ471	470	1
R58	ERDS2TJ104	100K	1
R59	ERDS2TJ561	560	1
R60	ERDS2TJ103	10K	1
R61	ERDS2TJ103	10K	1
R62	ERDS2TJ103	10K	1
R63	ERDS2TJ333	33K	1
R64	ERDS2TJ333	33K	1
R65	PQ4R10XJ102	1K	1
R66	ERDS2TJ822	8.2K	1
R67	ERDS2TJ223	22K	1
R68	ERDS2TJ103	10K	1
R69	ERDS2TJ152	1.5K	1
R70	ERDS2TJ152	1.5K	1
R71	ERDS2TJ331	330	1
R72	ERDS2TJ330	33	1
R73	ERDS2TJ330	33	1
R74	ERDS2TJ102	1K	1
R75	ERDS2TJ332	3.3K	1
R77	ERDS2TJ470	47	1
R78	ERDS2TJ272	2.7K	1
R79	ERDS2TJ103	10K	1
R80	ERDS2TJ272	2.7K	1
R81	ERDS2TJ822	8.2K	1
R82	ERDS2TJ822	8.2K	1
R83	ERDS2TJ822	8.2K	1
R84	ERDS2TJ472	4.7K	1
R85	ERDS2TJ472	4.7K	1
R86	ERDS2TJ822	8.2K	1
R87	PQ4R10XJ221	220	1
R88	PQ4R10XJ221	220	1
R89	ERDS2TJ331	330	1
R90	PQ4R10XJ102	1K	1
R91	PQ4R10XJ563	56K	1
R92	ERDS2TJ561	560	1
R93	PQ4R10XJ471	470	1
R94	PQ4R10XJ471	470	1
R95	PQ4R10XJ221	220	1
R96	PQ4R10XJ471	470	1
R97	PQ4R10XJ221	220	1
R98	PQ4R10XJ471	470	1
R99	PQ4R10XJ221	220	1
R100	PQ4R10XJ471	470	1
R101	PQ4R10XJ102	1K	1
R102	ERDS2TJ820	82	1
R103	ERDS2TJ103	10K	1
R104	ERDS2TJ272	2.7K	1
R105	ERDS2TJ273	27K	1
R106	ERDS2TJ102	1K	1
R107	ERDS2TJ472	4.7K	1
R108	ERDS2TJ102	1K	1
R109	ERDS2TJ562	5.6K	1
R110	ERDS2TJ563	56K	1
R111	ERDS2TJ104	100K	1
R112	ERDS2TJ103	10K	1
R113	ERDS2TJ181	180	1
R115	ERDS2TJ472	4.7K	1

Ref. No.	Part No.	Part Name & Description	Pcs
R117	EXBP86103K	10K	1
R118	ERDS2TJ103	10K	1
R119	ERDS2TJ682	6.8K	1
R120	ERDS2TJ103	10K	1
R121	ERDS2TJ103	10K	1
R123	ERDS2TJ222	2.2K	1
R128	PQ4R10XJ103	10K	1
R129	PQ4R10XJ103	10K	1
R130	ERDS2TJ272	2.7K	1
R131	PQ4R10XJ563	56K	1
R132	PQ4R10XJ103	10K	1
R133	PQ4R10XJ103	10K	1
R134	PQ4R10XJ102	1K	1
R135	PQ4R10XJ102	1K	1
R136	PQ4R10XJ471	470	1
R137	PQ4R10XJ221	220	1
R138	PQ4R10XJ102	1K	1
R139	PQ4R10XJ562	5.6K	1
R140	PQ4R10XJ563	56K	1
R141	PQ4R10XJ223	22K	1
R142	PQ4R10XJ223	22K	1
R143	PQ4R10XJ102	1K	1
R144	PQ4R10XJ822	8.2K	1
R145	PQ4R10XJ153	15K	1
R146	PQ4R10XJ102	1K	1
R147	PQ4R10XJ181	180	1
R151	ERDS2TJ822	8.2K	1
R152	ERDS2TJ123	12K	1
R153	ER016CKF1501	1.5K	1
R154	ERDS2TJ332	3.3K	1
R155	PQ4R10XJ822	8.2K	1
R156	PQ4R10XJ562	5.6K	1
R171	PQ4R10XJ224	220K	1
R172	PQ4R10XJ101	100	1
R173	PQ4R10XJ562	5.6K	1
R174	PQ4R10XJ152	1.5K	1
R177	PQ4R10XJ181	180	1
		(CAPACITORS)	
C1	PQCBC1H330JL	33P	1
C2	PQCBC1H330JL	33P	1
C3	PQCUV1E104ZF	0.1	1
C4	ECEA1CGA100	10	1
C5	PQCBC1C103MY	0.01	1
C6	PQCUV1H820JC	82P	1
C7	PQCUV1H820JC	82P	1
C8	PQCUV1E104ZF	0.1	1
C9	PQCUV1H103KB	0.01	1
C10	PQCUV1H103KB	0.01	1
C11	PQCUVIE104ZF	0.1	1
C12	PQCUV1H102J	0.001	1
C13	ECQM1H152JV	0.0015	1
C14	PQCUV1H121JC	120P	1
C15	PQCUV1H121JC	120P	1
C16	PQCUV1E104ZF	0.1	1
C17	ECEA1CG470S	47	1
C18	ECEA1CGA100	10	1
C19	PQCBC1H331KB	330P	1
C20	ECEA1CGA100	10	1
C21	PQCBC1H680JL	68P	1
C22	ECEA1CGA100	10	1
C23	ECEA1CGA100	10	1
C24	ECEA1CGA100	10	1
C25	PQCUV1E104ZF	0.1	1
C26	PQCBC1H331KB	330P	1
C27	ECEA1CGA100	10	1
C28	ECEA1CG221	220	1
C29	ECEA1CGA100	10	1
C30	ECEA1CGA100	10	1
C31	PQCUV1E104ZF	0.1	1
C32	ECEA1CGA101	100	1
C33	PQCBC1H102KB	0.001	1
C34	PQCBC1H102KB	0.001	1
C35	ECEA1HGA3R3	3.3	1
C36	ECEA1HGA3R3	3.3	1
C37	PQCUV1E104ZF	0.1	1
C38	ECEA1CGA100	10	1
C39	PQCUV1E104ZF	0.1	1

Ref. No.	Part No.	Part Name & Description	Pcs
C40	ECEA1CGA101	100	1
C41	ECEA1CGA101	100	1
C42	ECEA1CGA101	100	1
C43	ECEA1CGA101	100	1
C44	ECEA1CGA101	100	1
C45	PQCUV1E104ZF	0.1	1
C46	PQCUV1H223KB	0.022	1
C50	PQCUV1E104ZF	0.1	1
C51	PQCUV1E104ZF	0.1	1
C52	PQCUV1E104ZF	0.1	1
C53	PQCUV1E104ZF	0.1	1
C54	PQCUV1E104ZF	0.1	1
C55	PQCUV1E104ZF	0.1	1
C56	PQCUV1E104ZF	0.1	1
C57	PQCUV1E104ZF	0.1	1
C58	PQCUV1E104ZF	0.1	1
C59	PQCUV1E104ZF	0.1	1
C60	PQCUV1E104ZF	0.1	1
C61	PQCUV1E104ZF	0.1	1
C62	PQCUV1E104ZF	0.1	1
C63	PQCUV1E104ZF	0.1	1
C64	PQCUV1E104ZF	0.1	1
C65	PQCUV1E104ZF	0.1	1
C66	PQCUV1E104ZF	0.1	1
C67	PQCUV1E104ZF	0.1	1
C68	PQCUV1E104ZF	0.1	1
C69	PQCUV1E104ZF	0.1	1
C70	PQCUV1E104ZF	0.1	1
C71	PQCUV1E104ZF	0.1	1
C72	PQCUV1E104ZF	0.1	1
C73	PQCUV1E104ZF	0.1	1
C74	PQCUV1E104ZF	0.1	1
C75	PQCUV1E104ZF	0.1	1
C76	PQCUV1E104ZF	0.1	1
C77	PQCUV1E104ZF	0.1	1
C78	PQCUV1E104ZF	0.1	1
C79	PQCUV1E104ZF	0.1	1
C80	PQCUV1E104ZF	0.1	1
C81	PQCUV1E104ZF	0.1	1
C82	PQCUV1E104ZF	0.1	1
C83	PQCUV1E104ZF	0.1	1
C84	PQCUV1E104ZF	0.1	1
C85	PQCUV1E104ZF	0.1	1
C86	PQCUV1E104ZF	0.1	1
C87	PQCUV1E104ZF	0.1	1
C88	PQCUV1E104ZF	0.1	1
C90	PQCUV1E104ZF	0.1	1
C91	PQCUV1E104ZF	0.1	1
C93	PQCUV1E104ZF	0.1	1
C94	PQCUV1E104ZF	0.1	1
C95	PQCUV1E104ZF	0.1	1
C96	PQCUV1E104ZF	0.1	1
C97	PQCUV1E104ZF	0.1	1
C98	PQCUV1E104ZF	0.1	1
C100	PQCUV1H102J	0.001	1
C101	PQCUV1E104ZF	0.1	1
C102	PQCUV1E104ZF	0.1	1
C103	PQCUV1E104ZF	0.1	1
C104	ECEA1CG470S	47	1
C105	PQCBC1H561KB	560P	1
C106	PQCUV1E104ZF	0.1	1
C107	PQCUV1E104ZF	0.1	1
C108	PQCUV1H103KB	0.01	1
C109	PQCUV1E104ZF	0.1	1
C151	PQCUV1H181JC	180P	1
C153	PQCUV1E104ZF	0.1	1
C154	ECEA1CKS100	10	1
C155	PQCBC1H101KB	100P	1
C156	PQCUV1E104ZF	0.1	1
C171	PQCUV1E104ZF	0.1	1
C172	PQCUV1H390JC	39P	1
C173	PQCUV1H150JC	15P	1
C174	PQCUV1H390JC	39P	1
		(CONNECTORS)	
CN1	PQJP10D70Z	CONNECTOR , 10P	1
CN2	PQJP7D70Z	CONNECTOR, 7P	1
CN3	PQJP4D70Z	CONNECTOR,	1

Ref. No.	Part No.	Part Name & Description	Pcs
CN4	PQJP6D70Z	CONNECTOR, 6P	1
CN5	PQJP22G94Z	CONNECTOR, 22P	1
CN6	PQJP11G94Z	CONNECTOR, 11P	1
CN151	PQJP11G57Z	CONNECTOR, 11P	1
		OPERATION BOARD PARTS	
PWB2	PQWP28100M0M	OPERATION P.C.BOARD ASS'Y (NLA)	
		(PHOTO ELECTRIC TRANSDUCER)	
IC202	PQVITLP521	PHOTO ELECTRIC TRANSDUCER	1
		(TRANSISTOR)	
Q201	2SB1322	TRANSISTOR(SI)	1
		(DIODE)	
D201	LN368GPXTAB	LRD	1
		(SWITCH)	
S201~218	EVQ12405K	SWITCH	18
		(VARIABLE RESISTOR)	
VR201~203	PQVUAE07B53	VARIABLE RESISTOR, 5KΩ (B)	3
		(PILOT LAMP)	
PL201~203	PQAM02S25	PILOT LAMP	3
		(RESISTORS)	
R201	ERDS2TJ102	1K	1
R202	ERDS2TJ472	4.7K	1
R203	ERDS2TJ472	4.7K	1
R204	ERDS2TJ103	10K	1
R205	ERDS2TJ391	390	1
		(CAPACITORS)	
C201	ECEA1CKS100	10	
C202	ECEA1CKS100	10	
		(CONNECTORS)	
CN205	PQJP22G57Z	CONNECTOR, 22P	1
		POWER SUPPLY BOARD PARTS	
PWB3	PQWP38100M0M	POWER SUPPLY P.C.BOARDASS'Y (NLA)	
		(ICs)	
IC301	PQVITA76494P	IC	1
IC306	PQVITC4093BP	IC	1
		(PHOTO ELECTRIC TRANSDUCER)	
IC302~305	PQVITLP521	PHOTO ELECTRIC TRANSDUCER	4
		(TRANSISTORS)	
Q301, 302 ,310,311	2SK740	TRANSISTOR(SI)	4
Q303, 308 ,309	2SA933	TRANSISTOR(SI)	3
Q304	2SD2061	TRANSISTOR(SI)	1
Q305, 307 ,312	2SC1740S	TRANSISTOR(SI)	3
Q306	2SB1185E	TRANSISTOR(SI)	1
		(DIODES)	
D301	PQVDS3V10LF	DIODE(SI)	1
D302, 303	PQVDS2LA20	DIODE(SI)	2
D304	PQVDD10LCA20	DIODE(SI)	1
D305	PQVDD8LCA20R	DIODE(SI)	1
D306	MA4062	DIODE(SI)	1
D307	MA4100	DIODE(SI)	1
D308~311 ,313, 314	1SS131	DIODE(SI)	6
D312	ERZC14DK560	VARISTOR	1
D315	MA4082	DIODE(SI)	1

Ref. No.	Part No.	Part Name & Description	Pcs
		(COILS AND TRANSFERMERS)	
L301	PQLE100	COIL	1
L302	PQLQXC410K	COIL	1
L303	PQLE99	COIL	1
L304	PQLE98	COIL	1
T301	ETS29K283B	TRANSFORMER	1
		(VARIABLE RESISTORS)	
VR302	EVN32CA00B52	VARIABLE RESISTOR 500Ω (B)	1
		(RESISTORS)	
R301	ERDS2TJ100	10	1
R302	ERDS2TJ100	10	1
R304	ERDS2TJ472	4.7K	1
R305	ERDS2TJ103	10K	1
R306	ERDS2TJ221	220	1
R307	ERDS2TJ821	820	1
R308	ERDS2TJ152	1.5K	1
R309	ERDS2TJ181	180	1
R310	ERG2SJ220	22	1
R311	ERG2SJ220	22	1
R312	ER0S2TKF1503		1
R313	ER0S2CKF1002		1
R314	ER0S2TKF8201		1
R315	ER0S2TKF5601		1
R316	ERDS2TJ562	5.6K	1
R317	ERDS2TJ562	5.6K	1
R318	ERDS2TJ223	22K	1
R319	ERDS2TJ103	10K	1
R320	ER0S2TKF1332		1
R321	ERDS2TJ821	820	1
R322	ERDS2TJ271	270	1
R323	ERDS2TJ471	470	1
R324	ERDS2TJ562	5.6K	1
R325	ERDS2TJ562	5.6K	1
R326	ERDS2TJ472	4.7K	1
R327	ERDS2TJ123	12K	1
R328	ERDS2TJ123	12K	1
R329	ERDS2TJ223	22K	1
R330	ERDS2TJ562	5.6K	1
R331	ERDS2TJ470	47	1
R332	ERDS2TJ273	27K	1
R335	ERDS2TJ103	10K	1
R336	ERDS2TJ103	10K	1
R337	ERDS2TJ102	1K	1
R338	ERDS2TJ223	22K	1
R339	ERDS2TJ821	820	1
R340	ERDS2TJ223	22K	1
R341	ERDS2TJ221	220	1
		(CAPACITORS)	
C301	ECQV1H105JZ	1	1
C302	ECQV1H105JZ	1	1
C303	ECQV1H105JZ	1	1
C305	ECEA1HFS471	470	1
C306	ECEA1HFS471	470	1
C307	ECEA1CGA101	100	1
C308	ECEA1CGA101	100	1
C309	ECEA1CGA100	10	1
C310	ECEA1CG221	220	1
C311	ECEA1CFS471	470	1
C312	ECEA1CFS471	470	1
C313	ECEA1CFS471	470	1
C314	ECQP1472JZ	0.0047	1
C315	ECQP1472JZ	0.0047	1
C316	ECQV1H394JZ	0.39	1
C317	ECQV1H105JZ	1	1
C318	ECQP1H102GZ	0.001	1
C319	ECFD1C104KD	0.1	1
C320	ECEA1CGA100	10	1
C321	ECEA1HGA010	1	1
C323	PQCBC1C103MY	0.01	1
C324	PQCBC1H102KB	0.001	1
		(CONNECTORS)	
CN301	PQJP10D70Z	CONNECTOR , 10P	1
CN302	PQJP6D107Z	CONNECTOR, 6P	1
CN303, 305	PQJP5D70Z	CONNECTOR, 5P	2

Ref. No.	Part No.	Part Name & Description	Pcs
		CRT CONTROL BOARD PARTS	
PWB4	PANP31431Z	CRT CONTROL P.C.BOARD ASS'Y (NLA)	
		(TRANSISTORS)	
Q351	2SC3063	TRANSISTOR(SI)	1
Q352	2SA1179	TRANSISTOR(SI)	1
		(DIODE)	
D351	MA150	DIODE(SI)	1
		(COILS)	
L353	TLT082K991R	COIL	1
L354	TSK1008-1	COIL	1
		(SWITCHS)	
S352	PAAG10002	SWITCH	1
S353	PAAG10005	SWITCH	1
		(VARIABLR RESISTOR)	
R351	EVMK3GA00B52	VR, 500Ω (B) (USE P.C.B.NO. PANP 30935ZA)	1
R351	EVMK0GA00B52	VR, 500Ω (B) (USE P.C.B.NO. PQUP 828ZA)	
		(RESISTORS)	
R361	ERC14GK105	1M	1
R362	ERG2ANJ472	4.7K	1
R363	ERC14GK681	680	1
R365	ERC14GK103	10K	1
R366	ERC14GK184	180K	1
R367	ERJ8GEYJ470	47	1
R368	ERJ8GEYJ681	680	1
R369	ERJ8GEYJ391	390	1
		(CAPACITORS)	
C351	ECUV1H101JCM	100P	1
C353	ECKD2H102KB5	0.001	1
C359	ECEA1CGE101	100	1
		(FUSE)	
F801	XBA1C20NU100	FUSE	1
		CRT DISPLAY BOARD PARTS	
PWB5	PANP30935Z	CRT DISPLAY P.C.BOARD ASS'Y (NLA)	
		(IC)	
IC501	TVSUPC1379C	IC	1
		(TRANSISTORS)	
Q401	2SC2812	TRANSISTOR(SI)	1
Q402	2SC2812	TRANSISTOR(SI)	1
Q501	CRQA0190702	TRANSISTOR(SI)	1
Q502	2SC1384-R	TRANSISTOR(SI)	1
Q503, 506	2SA1179	TRANSISTOR(SI)	2
Q504	2SC2812	TRANSISTOR(SI)	1
Q505	2SC1384-R	TRANSISTOR(SI)	1
		(DIODES)	
D404	TVSDSF10TCBT	DIODE(SI)	1
D405	HZ11BITD	DIODE(SI)	1
D504	TVSRG2	DIODE(SI)	1
D508	TVSD1NK20-TP	DIODE(SI)	1
D514	TVSRD13ET1B3	DIODE(SI)	1
D515	TVSDSF10TCBT	DIODE(SI)	1
D512	TVSRU1CLFB1	DIODE(SI)	1
D509	RL4ZLF-MI	DIODE(SI)	1
		(VARIABLE RESISTORS)	
R405	EVND1AA00B14	VARIABLE RESISTOR, 10KΩ (B)	1
R410	EVND1AA00B52	VARIABLE RESISTOR, 500Ω (B)	1
R413	EVND1AA00B53	VARIABLE RESISTOR, 5KΩ (B)	1
R510	EVN49CA00B15	VARIABLE RESISTOR, 100KΩ (B)	1
R512	EVN49CA00B53	VR, 5KΩ (B)	1
R531	EVMJ6U10KB26	VR, 2MΩ (B) (USE P.C.B.NO. PANP 30935ZA)	1
R531	PQVG153HBB26	VR, 2MΩ (B) (USE P.C.B.NO. PQUP 828ZA)	1
		(COILS AND TRANSFORMERS)	
L501	ELH16F765	COIL	1
L502	PALH30601E	COIL	1
T501	PALF30807F	TRANSFORMER	1
T502	ETH16Y29AY	TRANSFORMER	1
		(RESISTORS)	
R401	ERJ8GEYJ272	2.7K	1
R403	ERJ8GEYJ122	1.2K	1
R406	ERJ8GEYJ123	12K	1
R407	ERQ12HJ120	12	1
R408	ERJ8GEYJ103	10K	1
R409	ERJ8GEYJ333	33K	1
R411	ERJ8GEYJ332	3.3K	1
R412	ERJ8GEYJ272	2.7K	1
R414	ERJ8GEYJ1R5	1.5	1
R415	ERJ8GEYJ1R0	1	1
R417	ERD25FJ221	220	1
R419	ERJ8GEYJ222	2.2K	1
R421	ERJ8GEYJ391	390	1
R422	ERJ8GEYJ103	10K	1
R423	ERJ8GEYJ103	10K	1
R424	ERJ8GEYJ562	5.6K	1
R425	ERJ8GEYJ103	10K	1
R501	ERJ8GEYJ820	82	1
R502	ERJ8GEYJ561	560	1
R503	ERJ8GEYJ562	5.6K	1
R505	ERDS1TJ271	270	1
R507	ERJ8GEYJ562	5.6K	1
R508	ERJ8GEYJ102	1K	1
R509	ERJ8GEYJ153	15K	1
R511	ERJ8GEYJ682	6.8K	1
R514	ERQ1CJP100S	10	1
R520	ERQ12AJ561	560	1
R521	ERQ12HJ272	2.7K	1
R522	ERJ8GEYJ273	27K	1
R527	ERDS1TJ333	33K	1
R537	ERG1SJU223V	22K	1
R545	ERJ8GEYJ271	270	1
R546	ERDS1TJ102	1K	1
R547	ERJ8GEYJ152	1.5K	1
R552	ERDS1TJ154	150K	1
R554	ERJ8GEYJ470	47	1
R555	ERJ8GEYJ102	1K	1
		(CAPACITORS)	
C404	ECEA1HGE2R2	2.2	1
C405	ECHS1H474JZ	0.47	1
C406	ECEA1CGE102B	1000	1
C407	ECEA1CGE470B	47	1
C408	ECEA1HGE3R3B	3.3	1
C409	ECEA1CGE102B	0.001	1
C410	ECEA1CGE101B	100	1
C411	ECHS1H104JZ	0.1	1
C412	ECUV1H103ZFM	0.01	1
C413	ECHS1H474JZ	470P	1
C504	ECEA1HGE010B	1	1
C505	ECHS1472JZ3	0.0047	1
C506	ECEA1AGE330B	33	1
C508	ECHS1H682JZ3	0.0068	1
C509	ECQF6183JZH	0.018	1
C511	ECQE1185KN	1.8	1
C518	ECEA2AGE470E	47	1
C519	ECEA1HFE331	330	1
C520	ECQE10473MV	0.047	1
C529	ECUV1E104ZFM	0.1	1
C530	ECHS1H104JZ	0.1	1
C531	ECUV1H153KBM	0.015	1
C532	ECEA1HGE2R2B	2.2	1
C540	ECKC3A331KB	330	1
C806	ECEA1CGE222E	0.0022	1

REPLACEMENT PARTS LIST

Model KX-G8100DM

Notes:

1. Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.
2. Important safety notice.
   Components identified by the ⚠ mark special characteristics important for safety. when replacing any of these components, use only manufacture's specified parts.
3. The S mark indicates service standard parts and may differ from production parts.
4. RESISTORS & CAPACITORS
   Unless otherwise specified.
   All resistors are in ohms(Ω) k=1000Ω,M=1000kΩ
   All capacitors are in MICRO FARADS(μF) P=μμF
   *Type &Wattage of Resistor
   Type

ERC:Solid	ERX:Metal Film	PQ4R:Carbon
ERD:Carbon	ERG:Metal Oxide	ERS:Fusible Resistor
PQRD:Carbon	ER0:Metal Film	ERF:Cement Resistor

Wattage

10,16:1/8W	14,25:1/4W	12:1/2W	1:1W	2:2W	3:3W

*Type & Voltage of Capacitor
Type

ECFD:Semi-Conductor	ECCD,ECKD,ECBT,PQCBC : Ceramic
ECQS:Styrol	ECQE,ECQV,ECQG : Polyster
PQCUV:Chip	ECEA,ECSZ : Electrolytic
ECQMS:Mica	ECQP : Polyproplylene

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H: 50V	05: 50V	0F:3.15V	0J :6.3V	1V :35V
2A:100V	1:100V	1A:10V	1A :10V	50,1H:50V
2E:250V	2:200V	1V:35V	1C :16V	1J :63V
2H:500V		0J:6.3V	1E,25:25V	2A :100V

Ref. No.	Part No.	Part Name & Description	Pcs
		CABINET AND ELECTRICAL PARTS	
1	PQYFG8100DMM	UPPER RADOM ASS'Y	1
2	PQYMG8100DMM	LOWER RADOM ASS'Y	1
3	PQWCG8100DMM	SHEILD COVER ASS'Y	1
4	PQWWG8100DMM	ANTENNA ASS'Y	1
5	PQAZE3561	MAGNETRON	1
6	PQJQ182Z	DC MOTOR	1
7	PQJWNJC3901E	CIRCULATOR	1
8	PQMC157Z	SHIELD COVER	1
9	PQMC201Z	SHEET	1
10	PQSA437Z	CHASSIS	1
11	PQHG947Z	PACKING	1
12	PQDG5030Z	GEAR	1
13	PQHE5023Z	BOLT	4
14	PQHG944Z	PACKING	1
15	PQHG945Z	PACKING	4
16	PQHG951Z	PACKING	1
17	PQHR150Z	CLAMPER	1
18	PQHR9534Z	CLAMPER	2
19	PQMD72Z	ANGLE	1
20	PQME60Z	ANGLE	1
21	PQXDSRX38	MICRO WAVE IC	1
22	PQZFG8100DMM	ROTARY JOINT ASS'Y	1
23	XSN4+60VW	SCREW	4
24	XVG8C20VW	BOLT (L=0.78")	4
25	XWA8BVW	WASHER	4
26	XWA6BVW	WASHER	4
27	XYN4+F10	SCREW	1
28	XWG6H19VW	WASHER	4
29	XXE3D4FR	SCREW	2
30	XYN3+C6	SCREW	3
31	XYN4+C12VW	SCREW	4
32	XYN4+C8VW	SCREW	8
33	XYN4+F16	SCREW	17
34	XNG26D	NUT	1
35	XYN26+C8	SCREW	1
36	XYN3+F10	SCREW	2
37	XNG3D	NUT	3
38	XYN3+F12	SCREW	1
39	XYN3+F8	SCREW	27
40	XWG8VW	WASHER	4
41	XWA4VW	WASHER	4
42	PQJS10R38Z	CONNECTOR, 10P	1
		ACCESSORIES AND PACKING MATERIALS	
A1	PQZMG8100DMM	BOLT, WASHER ASS'Y (BOLT L=1")	1
A2	KX-G70	SIGNAL CABLE	1
P1	PQPH109Z	PROTECTION COVER	1
P2	PQPK1349Z	PACKING CASE	1
P3	PQPN9068Z	PAD	1
		RECEIVER BOARD PARTS	
PWB6	PQWPG8100DMM	RECEIVER P.C.BOARD ASS'Y (NLA)	
		(ICs)	
IC601	AN5712	IC	1
IC602	AN5712	IC	1
IC603	AN5722	IC	1
IC604	PQVINJM4558D	IC	1
		(TRANSISTOS)	
Q601	2SC2570A	TRANSISTOR(SI)	1
Q603	2SC2412K	TRANSISTOR(SI)	1
Q604,605	2SB709A	TRANSISTOR(SI)	2
Q606	2SC2412K	TRANSISTOR(SI)	1
Q607-609 611,615	2SD601R	TRANSISTOR(SI)	5
Q610	2SD1302	TRANSISTOR(SI)	1
Q612-14	2SC2412K	TRANSISTOR(SI)	3
Q616	PQVTDTC144E	TRANSISTOR(SI)	1
		(DIODES)	
D601,602	MA151WK	DIODE(SI)	2
D605,606	MA700A	DIODE(SI)	2
D607,611	1SS131	DIODE(SI)	2
D608,609	MA153	DIODE(SI)	2
D613	MA4056	DIODE(SI)	1
D614	MA4051	DIODE(SI)	1
		(COILS AND TRANSFORMERS)	
L601,603, 605	PQLQZMR22K	COIL	3
L602	PQLQZM220K	COIL	1
L604	PQLQZM2R7M	COIL	1
T601,602, 603,605	PQLA7A18	COIL	4
		(OTHER)	
TH601	ERTD2ZGL102	THERMISTOR	1

Ref. No.	Part No.	Part Name & Description	Pcs
		(RESISTORS)	
R601	PQ4R10XJ103	10K	1
R602	PQ4R10XJ272	2.7K	1
R603	PQ4R10XJ101	100	1
R608	PQ4R10XJ681	680	1
R609	ERDS2TJ472	4.7K	1
R610	PQ4R10XJ122	1.2K	1
R611	ERDS2TJ681	680	1
R612	PQ4R10XJ822	8.2K	1
R613	PQ4R10XJ682	6.8K	1
R614	PQ4R10XJ181	180	1
R615	PQ4R10XJ102	1K	1
R616	PQ4R10XJ222	2.2K	1
R617	PQ4R10XJ103	10K	1
R618	ERDS2TJ102	1K	1
R619	PQ4R10XJ102	1K	1
R621	PQ4R10XJ220	22	1
R622	PQ4R10XJ560	56	1
R623	ERDS2TJ561	560	1
R624	PQ4R10XJ471	470	1
R625	ERDS2TJ100	10	1
R627	PQ4R10XJ224	220K	1
R628	PQ4R10XJ101	100	1
R629	PQ4R10XJ564	560K	1
R630	PQ4R10XJ101	100	1
R631	PQ4R10XJ103	10K	1
R632	PQ4R10XJ392	3.9K	1
R633	PQ4R10XJ152	1.5K	1
R634	PQ4R10XJ683	68K	1
R635	PQ4R10XJ153	15K	1
R636	PQ4R10XJ562	5.6K	1
R637	PQ4R10XJ102	1K	1
R639	PQ4R10XJ102	1K	1
R640	PQ4R10XJ561	560	1
R641	PQ4R10XJ563	56K	1
R642	PQ4R10XJ152	1.5K	1
R643	PQ4R10XJ102	1K	1
R644	PQ4R10XJ220	22	1
R646	PQ4R10XJ823	82K	1
R647	PQ4R10XJ223	22K	1
R648	PQ4R10XJ683	68K	1
R651	PQ4R10XJ104	100K	1
R652	PQ4R10XJ103	10K	1
R653	PQ4R10XJ102	1K	1
R654	ERG1SJ560	56	1
R655	PQ4R10XJ222	2.2K	1
R656	PQ4R10XJ102	1K	1
R657	ERDS2TJ681	680	1
R658	PQ4R10XJ103	10K	1
R659	PQ4R10XJ102	1K	1
R660	PQ4R10XJ122	1.2K	1
R661	PQ4R10XJ824	820K	1
R662	PQ4R10XJ472	4.7K	1
R663	PQ4R10XJ271	270	1
R664	PQ4R10XJ564	560K	1
R665	PQ4R10XJ221	220	1
R666	PQ4R10XJ474	470K	1
R667	PQ4R10XJ101	100	1
R668	PQ4R10XJ154	150K	1
R669	PQ4R10XJ102	1K	1
R670	PQ4R10XJ102	1K	1
R671	PQ4R10XJ102	1K	1
R672	PQ4R10XJ102	1K	1
R673	PQ4R10XJ103	10K	1
R674	ERDS2TJ220	22	1
R675	PQ4R10XJ470	47	1
R676	PQ4R10XJ391	390	1
		(CAPACITORS)	
C601	PQCUV1H100DC	10P	1
C602	PQCUV1H102J	0.001	1
C603	PQCUV1H102J	0.001	1
C604	PQCUV1H103KB	0.01	1
C606	PQCUV1H120JC	12P	1
C607	PQCUV1H101JC	100P	1
C608	PQCUV1H103KB	0.01	1
C609	PQCUV1H103KB	0.01	1

Ref. No.	Part No.	Part Name & Description	Pcs
C610	PQCUV1H103KB	0.01	1
C611	PQCUV1H150JC	15P	1
C612	PQCUV1H102J	0.001	1
C613	PQCUV1H102J	0.001	1
C614	PQCUV1H150JC	15P	1
C615	PQCUV1H101JC	100P	1
C616	PQCUV1H103KB	0.01	1
C617	PQCUV1H103KB	0.01	1
C618	PQCUV1H103KB	0.01	1
C620	PQCUV1H101JC	100P	1
C621	ECEA1HU100	10	1
C622	PQCUV1H103KB	0.01	1
C623	ECEA1HU100	10	1
C624	PQCUV1H103KB	0.01	1
C626	PQCUV1H150JC	15P	1
C627	PQCUV1H102J	0.001	1
C628	PQCUV1H101JC	100P	1
C629	ECEA1HU010	1	1
C630	ECEA1HU100	10	1
C631	PQCUV1H103KB	0.01	1
C632	ECEA1HU100	10	1
C633	PQCUV1H680JC	68P	1
C634	PQCUV1H821JC	820P	1
C635	PQCUV1H221JC	220P	1
C636	PQCUV1H103KB	0.01	1
C637	ECEA1HU100	10	1
C639	PQCUV1H103KB	0.01	1
C640	ECEA1HU100	10	1
C641	PQCUV1H103KB	0.01	1
C642	ECEA1HU100	10	1
C643	ECKD1H103KB	0.01	1
C644	ECEA1HU100	10	1
C645	ECKD1H103KB	0.01	1
C646	ECEA1AU470	47	1
C647	PQCUV1H103KB	0.01	1
C650	ECEA1CU221	220	1
C651	PQCUV1H101JC	100P	1
C652	PQCUV1H101JC	100P	1
C653	PQCUV1H102J	0.001	1
C654	PQCUV1H102J	0.001	1
C655	PQCUV1H561JC	560P	1
C656	PQCUV1H102J	0.001	1
C657	PQCUV1H102J	0.001	1
C658	PQCUV1H102J	0.001	1
C659	PQCUV1H102J	0.001	1
C660	PQCUV1H103KB	0.01	1
C661	PQCUV1H103KB	0.01	1
C662	PQCUV1H103KB	0.01	1
C663	ECEA1HU100	10	1
C681	PQCUV1H103KB	0.01	1
			1
			1
			1
		(CONNECTORS)	1
CN601	PQJP4D70Z	CONNECTOR	1
CN602	PQJP10D70Z	CONNECTOR	1
CN604	PQJP2D70Z	CONNECTOR	1

TRANSMITTER BOARD PARTS

PWB7	PQWPG8100DMM	TRANSMITTER P.C.BOARD ASS'Y (NLA)	
		(ICs)	
IC801	PQVIHD7L221D	IC	1
IC802	PQVITA76494P	IC	1
IC805	PQVITC4051F	IC	1
IC806	PQVITC4024F	IC	1
IC807	PQVITC4013F	IC	1
IC808	AN6562	IC	1
IC809	AN6562	IC	1
		(TRANSISTOS)	
Q801,821	2SD601R	TRANSISTOR(SI)	2
Q803	2SC2901K	TRANSISTOR(SI)	1
Q804	2SC1162D	TRANSISTOR(SI)	1

Ref. No.	Part No.	Part Name & Description	Pcs
Q805	2SA715D	TRANSISTOR(SI)	1
Q806	2SK1161	TRANSISTOR(SI)	1
Q807	2SK1305	TRANSISTOR(SI)	1
Q810,820 822-824	PQVTDTC144E	TRANSISTOR(SI)	5
Q811	2SD1302	TRANSISTOR(SI)	1
Q812	2SB709A	TRANSISTOR(SI)	1
		(DIODES)	
D802	MA4051	DIODE(SI)	1
D803	PQVDS2V60	DIODE(SI)	1
D804,805	1SS131	DIODE(SI)	2
D807,810, 813	PQVDD1NL20	DIODE(SI)	3
D808	PQVDS2LA20	DIODE(SI)	1
D809	PQVDSRU4D304	DIODE(SI)	1
D811,814, 832	MA4130	DIODE(SI)	3
D812,815	EZCDB4D220M	DIODE(SI)	2
D813	PQVDD1NL20	DIODE(SI)	1
D830	MA151WA	DIODE(SI)	1
D831	MA151WK	DIODE(SI)	1
		(COILS AND TRANSFORMERS)	
L801	PQLE97	COIL	1
L802,803	PQLQXA222JT	COIL	2
L804	PQLE90	COIL	1
T801	PQLT1I9MZ	TRANSFORMER	1
T802	ETS29K365V	TRANSFORMER	1
		(VARIABLE RESISTOR)	
VR801	EVN38CA00B14	VARIABLE RESISTOR, 10KΩ (B)	1
		(RESISTORS)	
R802	ERDS2TJ222	2.2K	1
R803	PQ4R10XJ102	1K	1
R804	PQ4R10XJ103	10K	1
R805	ER0S2TKF1402	14K	1
R806	PQ4R10XJ153	15K	1
R807	PQ4R10XJ472	4.7K	1
R808	PQ4R10XJ102	1K	1
R809	ERDS2TJ471	470	1
R810	PQ4R10XJ100	10	1
R811	PQ4R10XJ103	10K	1
R812	ERX2SJR22	0.22	1
R813	ERDS2TJ121	120	1
R814	PQ4R10XJ102	1	1
R815	ERX1SJ1R0	1	1
R816	PQ4R10XJ474	470K	1
R817	PQ4R10XJ391	390	1
R818	PQ4R10XJ391	390	1
R820	ERG1SJ680	68	1
R821	PQ4R10XJ682	6.8K	1
R822	PQ4R10XJ122	1.2K	1
R823	PQ4R10XJ332	3.3K	1
R824	PQ4R10XJ122	1.2K	1
R825	PQ4R10XJ123	12K	1
R831	ERDS2TJ101	100	1
R832	ERDS1VJ114	110K	1
R833	ERDS1VJ114	110K	1
R836	ER0S2TKF6651	6.65K	1
R837	PQ4R10XJ562	5.6K	1
R850	PQ4R10XJ102	1K	1
R851	PQ4R10XJ103	10K	1
R852	PQ4R10XJ103	10K	1
R853	PQ4R10XJ103	10K	1
R854	PQ4R10XJ103	10K	1
R855	PQ4R10XJ102	1K	1
R856	PQ4R10XJ273	27K	1
R858	PQ4R10XJ103	10K	1
R859	PQ4R10XJ104	100K	1
R860	PQ4R10XJ222	2.2K	1
R861	PQ4R10XJ102	1K	1
R862	PQ4R10XJ563	56K	1
R863	PQ4R10XJ563	56K	1
R864	PQ4R10XJ153	15K	1
R865	PQ4R10XJ473	47K	1
		(CAPACITORS)	
C801	PQCUV1H101JC	100P	1
C802	PQCUV1H560JC	56P	1
C803	PQCUV1H561JC	560P	1
C804	ECKC3A332KB	0.0033	1
C805	PQCUV1E104MD	0.1	1
C806	PQCUV1E104MD	0.1	1
C807	PQCUV1E104MD	0.1	1
C808	PQCUV1H472KB	0.0047	1
C809	ECEA1EU101	100	1
C810	PQCUV1H103KB	0.01	1
C811	ECEA1EU101	100	1
C812	PQCUV1H102J	0.001	1
C813	ECWF4105KZ	1	1
C814	PQCUV1E104MD	0.1	1
C815	PQCUV1E104MD	0.1	1
C816	PQCUV1E104MD	0.1	1
C817	PQCUV1E104MD	0.1	1
C818	ECQB1H104JZ	0.1	1
C819	ECEA1HFS471	470	1
C820	ECQP1H472JZ	0.0047	1
C821	ECEA1CU331	330	1
C823	PQCUV1H102J	0.001	1
C824	ECEA1CF221	220	1
C825	ECEA2WU2R2	2.2	1
C826	ECEA2WU2R2	2.2	1
C827	ECEA2AFE120	12	1
C828	ECEA2AFE120	12	1
C829	ECEA1CU221	220	1
C830	PQCUV1H102J	0.001	1
C850	PQCUV1H103KB	0.01	1
C851	PQCUV1E104MD	0.1	1
C852	PQCUV1E104MD	0.1	1
C853	PQCUV1E104MD	0.1	1
C854	PQCUV1E104MD	0.1	1
C855	ECEA1HU100	10	1
C856	PQCUV1H102J	0.001	1
C859	PQCUV1H103KB	0.01	1
C860	PQCUV1H103KB	0.01	1
C861	PQCUV1H103KB	0.01	1
		(CONNECTORS)	
CN801	PQJP5D70Z	CONNECTOR, 5P	1
CN803	PQJP5D107Z	CONNECTOR, 5P	1
CN804	PQJP3D70Z	CONNECTOR, 3P	1
CN805	PQJP6D70Z	CONNECTOR, 6P	1
CN806	PQJP2D30Z	CONNECTOR, 2P	1

SENSOR BOARD PARTS

IC851	DN6848S	IC	1
C681	PQCUV1H103KB	0.01	1
W851	PQJS3R38Z	CONNECTOR, 3P	1

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